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The Charles MacKay Lecture.[1]

THE LIFE AND WORKS OF SIR CHARLES BELL.

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THE Charles MacKay Lecture, which I have the honour to deliver this year, was founded some few years ago by Miss Mackenzie to honour the memory of her grandfather, Charles MacKay, who won a leading place in the hearts of his pupils and friends during the short period of eleven years which he spent in Victoria. Charles MacKay came to Victoria in 1852 and until his death in 1863 made his mark as a successful and sympathetic teacher and educationist.

The founder of this lectureship has expressed the wish that the lecturer should choose some subject dealing with the history of medicine as it affects the history of mankind. I think you will agree with me that the history of medicine, which describes the ills which afflict mankind, is very largely occupied with the history of mankind. No history of mankind would be in any way complete which omitted an account of the diseases of humanity and some mention of those men, whether primitive medicine men, priest-physicians, magicians or modern members of learned faculties, who have endeavoured to cure these diseases.

If we look back over the long centuries during which man, as we know him, has laboured and fought in this world of ours, we see plainly how closely the progress of countries and their peoples has been affected by the diseases which have from time to time decimated their inhabitants and how small insects and minute bacteria have altered the course of history.

[1] Delivered at the Australian Institute of Anatomy, Canberra, on October 6, 1936.

Let us go back to the Greece of the fifth century B.C., to the year 430. The country was in a state of war and large armies were camped in Attica. The country people fled into Athens to escape from the Lacedæmonians. Then in the overcrowded city broke out what was called the "plague of Athens". Of the exact nature of the disease we are not sure—it may have been typhus or plague or smallpox—the diagnosis is immaterial. The fact remains that this plague had a profound effect upon historical events. Athenian life was completely demoralized. Men no longer took trouble to obey the laws. After a few months the Lacedæmonian army, attacked by the disease, had to fly the country, and Zinsser tells us in his fascinating book, "Rats, Lice and History", that "the struggle between the two contending powers was influenced in its duration as much by the epidemic as by any generalship or force of arms".

A striking instance is to be found in mediæval times in Europe and England. Those of you who will, may read in the vivid pages of the Abbot Gasquet about the ravages of the "black death"—our bubonic plague—which caused the destruction of one-fourth of the population of the earth (over sixty millions of human beings). The black death appeared in Europe about 1348. In England, according to contemporary accounts, only one-tenth of the population survived. The epidemic altered the whole course of European history; whole families disappeared, towns were left empty and whole tracts of country went out of cultivation. It was a disaster for Europe comparable with, and perhaps greater than, that of the late World War. Sir George Newman has called this epidemic "the first great and solemn warning as to the necessity of preventive medicine" and he goes on to lament "how little regard is paid by the historian to the influence of disease in directing the destiny of man".

To come down to more recent times. Is not the history of the completion of the Panama Canal very largely the history of the conquest of yellow fever and malaria by Gorgas and his assistants?

The course of the war in South Africa was largely influenced by the great mortality caused by enteric fever, and no history of the Great War of 1914-1918 would be complete without a description of the conquest of this disease, a conquest which made it possible to maintain great armies in the field in excellent health.

The three great factors which have slowed down the progress of the human race are density of population, war and pestilence—and the greatest of these is pestilence.

Perhaps I may be permitted to say a few words on the more individual aspect of the connexion of the history of mankind with the history of medicine. This aspect of medical history has produced many most fascinating, if somewhat speculative, books in recent years. The study of the health of certain famous historic personages, so far as it has influenced their actions, has thrown much new light on the dark pages of history. This study must be used with caution, for in many cases our information as to the personal health of celebrities is very incomplete; much of it is contemporary gossip and a good deal of it legendary. It is nevertheless a very fascinating, if somewhat futile, speculation to wonder, for example, whether, if Napoleon had enjoyed better health on the critical day of Waterloo, the result of that battle might have been different. Again, if the Emperor Frederick of Germany, a man of great nobility of character, married to an English princess, had not died of cancer of the throat, thus leaving the control of a great Empire to a young man of unbalanced temperament, perhaps we should not have had the Great War.

The foundation of this lectureship has helped to bring Australia into line with the great revival of the interest in medico-historical studies which has taken place during the last few years. Recently we have seen the foundation of several institutes for the study of the history of medicine in Europe and America, together with the establishment of chairs and lectureships in this subject in most countries, including Soviet Russia.

To me this has been a source of great gratification. Just thirty years ago, when on a visit to England, I first became interested in medical history. At that time the subject was completely neglected. The great discoveries of the nineteenth century had thrown into the shade everything medical which had happened in the previous centuries. The medical world cried out: "Why linger by the way to study the past when the present and the future hold all that is of importance?" When mentioned at all, the history of medicine was used to fill up gaps in addresses on formal occasions when pompous old gentlemen inflicted more or less erroneous medico-historical legends on long-suffering audiences, or raised a laugh by pointing out the absurd and ridiculous mistakes made by their colleagues of a bygone age. They themselves quite forgot that many of their cherished ideas and beliefs would cause as much mirth when related to an audience in some future age. Of books on the subject there were few. I remember hunting through the old book shops of London and Continental cities only to find my inquiries for books on the history of medicine received with surprise and the assurance that there were not any.

This was very nearly the truth. When I returned to Australia I prided myself on possessing practically everything on the subject in several languages, and in the light of the present-day supply my books were a very poor lot. I remember being told by one consultant that an interest in medical history was an amiable and harmless form of eccentricity, but inadvisable in one of my then tender age; that there would be time enough to take to it when I reached that state of senility in which new ideas were difficult to assimilate and apt to shake cherished beliefs; then, and then only,

should the veteran doctor take refuge from the flood of new discoveries in the contemplation of the past glories of his profession.

Within ten years a great change came over the profession in its attitude to historical studies. This was largely due to William Osler in America, Clifford Allbutt, D'Arcy Power and Norman Moore in England, and to the great historian, Karl Sudhoff, in Germany. The interest grew by leaps and bounds, and at the present day in most medical schools history, so long the Cinderella of medical studies, no longer hides her head, forgotten and despised.

To own or even read all the books published nowadays on medical history would be impossible; and to read the journals specially devoted to the subject would require a knowledge of most of the languages of Europe. One historical journal, *Archeion*, publishes articles in five languages.

Old medical books and manuscripts have been rescued from the top shelves of libraries and dug out of dusty attics and cupboards, their contents reedited and critically examined by skilled medical scholars with, in some cases, results not very flattering to our modern conceit. Many of our vaunted discoveries are only rehashes of facts long since discovered and forgotten. One medical historian puts it: "How old the new, how new the old!" And very true are the words of that wise old seventeenth century clergyman, Thomas Fuller:

> History maketh a young man to be old without either wrinkles or grey hairs; privileging him with the experience of age without either the infirmities or inconveniences thereof. Yea, it not only maketh things past present, but enableth one to make a rational conjecture of things to come.

My subject tonight is "The Life and Work of Sir Charles Bell". I think the choice of subject will comply with the conditions of this bequest. The discoveries of Charles Bell, leading as they did to a revolution in our ideas of the anatomy of that most complex and least understood region of the human body, the nervous system, have influenced the history of mankind most profoundly. From the time of the great medical dictator Galen no advance had been made in the knowledge of nervous diseases; for almost 1,800 years we groped in the dark, propounding wild theories until the patient researches of a young Scottish surgeon opened the path to our present great, though far from complete, knowledge of these intricate structures.

Charles Bell has a link in common with Charles MacKay. They were both born north of the Tweed; they both spent their early years in their native country, and although there was a difference of thirty years in their ages, they were both born in the long reign of George III and lived through four reigns, to die in that of Queen Victoria. Having reached manhood, they, like so many of their fellow countrymen, left their native Scotland to seek fortune abroad. MacKay died an exile in Victoria; Bell, after thirty-two busy and productive years in London, returned to spend the last few years of his life in his beloved Edinburgh.

Before describing to you the events in Bell's life, it is necessary to gain some idea of the age in which he lived, for, as Sigerist, the medical historian, says, "medical history is but one aspect of general civilization and therefore cannot be understood fully unless one has some knowledge of the cultural background of a given period". The period during which Charles Bell lived, namely, the seventy years from 1774 up to 1842, was one during which the living conditions of mankind underwent vast changes. When Bell entered the world in 1774 the first rumblings of the American Revolution were to be heard. Only the previous year the riots had taken place at Boston over the duty on tea, the episode nicknamed "the Boston tea party", and the year 1775 was to see the outbreak of the disastrous war between England and her colonies, which ended eight years later in the independence of the American States. In 1774, Louis XVII still reigned in France, but already the ideas of Voltaire and Rousseau were spreading among the French people, and in 1789, when Bell was a schoolboy of fifteen in Edinburgh, the French Revolution had deposed the king, and the nobility of France had begun to pay the penalty for the ill-deeds of their ancestors during centuries of oppression. During the years 1793 and 1794 the Reign of Terror was at its height and no man's head was safe. Then in 1796 came the Napoleonic wars, which occupied the energies of Europe for nineteen years, relief coming only with the downfall of Napoleon in 1815. Freed from the incubus of war, England and Europe passed through a period of financial boom followed by depression similar to our experience since the World War. When Bell was born, England was still a rural community, but the manufacturing age was close at hand and with the beginning of the nineteenth century was well under way. The demand for labour led to an emigration of the rural population to the towns in the industrial areas, this again causing overcrowding, resulting in the formation of slums. At this period factory laws were non-existent and the conditions under which men, women and young children worked were appalling. When Bell died in 1842, Queen Victoria had been ruling for five years and England had entered that era of prosperity which we now call the Victorian Age, an age to which so many of our seniors look back with regret as the Golden Age, and our juniors with contempt as embodying all that is old-fashioned and fusty.

From a medical point of view the eighteenth century has been labelled the century of theoretical systems in which little progress was made. This may be true if we consider only the first seventy years. No discovery was made comparable with that of the immortal Harvey, none to equal the discovery of the magnet by William Gilbert, or the discoveries of Leeuwenhoek, Malpighi and Hooke, working with the newly discovered microscope. There were no medical men to rival the greatness of the physicians Sydenham and Willis, or the surgeon Richard Wiseman, to mention only a few

great names. During the years from 1700 up to the time of the Hunters, William and John, medical men would seem to have been too busy applying the discoveries of the previous century to find time to make fresh researches; and to have wasted much time in trying to fit the new wine of freshly discovered scientific facts into the old bottles of worn-out theoretical systems. With the last twenty-five years of the century the spirit of research was born again to achieve its greatest triumphs with that great genius John Hunter, anatomist and surgeon. Thomas Percival, John Howard and Elizabeth Fry worked to improve the conditions of the poorer classes, James Lind and Gilbert Blane to improve the health of the sailors to whose efforts England owed her mastery of the seas, and John Pringle realized the importance of a fact long overlooked, that, in order to fight well, a soldier must be healthy.

The closing years of the eighteenth century were to see the conquest of one of the great plagues of humanity. When Edward Jenner performed his first vaccination on May 14, 1796, medical science had won a victory of inestimable benefit to mankind.

To give even a brief history of all the great advances made by medical science during the first forty years of the nineteenth century, during which Bell lived and worked, would require a series of lectures. The great discoveries in physics, chemistry and biology which mark the beginning of the nineteenth century all contributed to the advance of medicine. To begin with, a great French school of medicine led the way, and the names of Broussais, Louis, Bretonneau and Corvisart were magnets which drew students to Paris in hundreds. Laennec in 1819 invented the stethoscope and opened up a new world to the physician and a new hope for the sufferers from diseases of the lungs and heart. The efforts of the Frenchman Pinel abolished forever the incredible cruelty which had been used in the treatment of the insane. The surgeons such as the Englishmen Cooper and Benjamin Travers, the Irishman Abraham Colles, the Scotchmen Liston and Syme, the Frenchmen Larrey, Dupuytren and Nélaton, and the American Valentine Mott, to mention only a few, all operated with skill and helped to advance the surgical art; but surgery had yet to wait for the discovery of anæsthesia, which did not happen until two years after Bell's death in 1844, and of antisepsis, which doctrine Lister was to force upon a reluctant world in 1867. After Lister, surgery entered upon its golden age.

Following the work of the French school of medicine there arose an Irish school of clinical medicine, to which belongs the work of Graves, Stokes and Dominic Corrigan. The English schools, not to be outdone, produced such great clinicians and observers as Richard Bright, Thomas Addison and Thomas Hodgkin.

No list of the historic medical names of the early years of the nineteenth century would be complete without that of Semmelweiss, the Hungarian obstetrician, whose discovery of the cause of child-bed fever has saved the lives of countless mothers. Semmelweiss is one of the martyrs of medicine, for, hounded down by those in authority who opposed his teachings, he ended his days in an asylum. The way of the transgressor may be hard, but the path of the medical pioneer is infinitely more stony.

Charles Bell was the youngest of six children of William Bell, a clergyman of the Episcopal Church of Scotland. His father's small curacy of Doun in Monteath brought him the princely salary of £25 *per annum* and, we are told, sufficed to procure an ample education for his three eldest sons. This would appear to be impossible to us moderns, but the fact remains that the eldest, Robert, became what we would nowadays call a solicitor and notary; the second, John, of whom we shall hear more later, became a celebrated surgeon; and George Joseph, the third, the life-long confidant and adviser of his young brother Charles, gained the chair of Scottish law in Edinburgh University.

Our poor clergyman, "passing rich on twenty pounds a year", lived only five years after the birth of Charles and left the burden of the family's education to his wife, a woman of great strength and nobility of character. To her the youngest son owed all his early teaching, for he tells us later on: "I received no education but from my mother; neither reading, writing, ciphering, nor anything else." He was sent to the High School at Edinburgh and had as his schoolmates such future celebrities as Sir Walter Scott, the novelist, Francis Jeffrey, one of the founders and critics of the *Edinburgh Review*, whose reviews of current literature were to cause so much heartburning to poets such as Byron, Shelley, Keats and Wordsworth, and who was to fight a duel with the Irish poet Thomas Moore.

Throughout her life her sons seem to have been devoted to their mother, and Charles once again tells us: "For twenty years of my life I had but one wish—to gratify my mother." From her was inherited his artistic genius, and during his school-days, which he afterwards referred to as "torture and humiliation", he developed his gift for draughtsmanship, forming a friendship with the artist David Allan, who was called the "Hogarth of Scotland". Passing on to the University of Edinburgh, Charles Bell studied anatomy and medicine under Joseph Black, the famous chemist, James Gregory, the leading physician of the day, and Alexander Munro, the second of the name. Among the teachers who greatly influenced the young student was Dugald Stewart, whose lectures on philosophy were famous for their eloquence and learning, and whose influence on the students of Edinburgh has been compared with that of Socrates on the youths of ancient Greece.

Bell made great progress with his anatomical studies, and in 1798, while still a student, published his "System of Dissections", which contains most beautiful anatomical plates, thought by many good judges to be equal to any ever published. His brother John entrusted to him the description of the nervous system in his "Anatomy of the Human

Body", published in successive volumes from 1794 to 1800. Graduating in 1799, Bell became a member of the Royal College of Surgeons of Edinburgh and began his career as a surgeon. Greatly interested in pathology, he used his artistic talent to model in wax perfect replicas of disease conditions seen in the hospital. In addition, he helped his brother John in lecturing to his anatomical classes, and his class numbered over ninety pupils.

Charles Bell was now well on the way to fame and success in his native city of Edinburgh when, in 1804, all his future was changed. To understand what follows and the causes which led to the migration to London, we must make a short digression and go back a few years to consider the peculiar situation of the teaching of anatomy in Edinburgh.

The teaching of anatomy in Edinburgh dates well back into the sixteenth century, when the Guild of Surgeons and Barbers was incorporated and was granted by the Town Council "once in the year one condemned man after he be dead to make anatomy wherefore we may have experience to instruct others". It was not until 1645 that we find for the first time a teacher of anatomy mentioned, and in 1647 three rooms of a tenement in Dickson's Close were taken as a meeting place. In 1697 the Surgeons' Hall was occupied on a site given by the Town Council, and from then on the teaching of anatomy became systematic. In 1717 the *régime* of the Monros began and lasted for one hundred and twenty-six years. Father, son and grandson, they held the chair of anatomy against all-comers. Alexander Monro *primus* and *secundus* were men of ability and did much to advance the science of anatomy; but Alexander *tertius* proved himself an unsuccessful teacher and the students went to outside teachers. It is related that "he used to read his grandfather's lectures written about a century before; and even the shower of peas with which the expectant students greeted his annual reference, 'When I was a student in Leyden in 1719', failed to induce him to alter the dates". In 1786 John Bell, returning to Edinburgh, saw a great chance. He began to lecture, and soon so great was his success that he built an anatomical school adjoining the Surgeons' Hall; here he gave those lectures on surgical anatomy which may be said to have founded the subject of surgical anatomy. John, like Charles, was an expert artist, and students flocked to his demonstrations, to the great annoyance of the university professors Monro and James Gregory. A word about Dr. James Gregory, whose name will bring back to many of you unpleasant recollections of your youth. He it was who inflicted on suffering childhood that nauseous powder, the original *Pulvis Rhei Compositus*, known as "Gregory's powder". The Gregorys were, like the Monros, a family whose name is written large in the history of the University of Edinburgh. Within one hundred and fifty years they supplied sixteen professors to English and Scottish universities, and—a strange coincidence—the Church of Rome numbers sixteen popes named Gregory. Dr. James Gregory lived at a time when controversies between learned men raged fiercely. Our James was fond of controversy, and in John Bell he found a worthy adversary. It would serve no useful purpose to resurrect all the hard things said on either side; personalities were exchanged, and our student, Charles Bell, was drawn into the fray on the side of his brother John. After much commotion Monro and Gregory gained the day, with the result that the brothers Bell were excluded from the hospital. Filled with disgust, John ceased his lectures and, confining himself to surgical practice, became the leading consultant and operator in Scotland for the next twenty years. Charles took over the class in 1799 and struggled against his opponents until 1804, when he decided to emigrate to London. His friend Jeffrey, writing on November 4, 1804, says: "All the world migrates to London. My good friend Charles Bell is about to follow your bad example; he has almost determined to fly and establish himself in the great asylum."

At the age of thirty Bell found himself on the threshold of a new life. At this time Scotsmen were not very popular in England, perhaps because they had won their way to leading positions; and one satirist describes an emigrant from the north of the Tweed in the following doggerel:

> Scapin to serve and Machiavel to plot,
> Red-haired, thin-lipp'd, sly, subtle, and a—Scot.

London did not impress Bell favourably on his arrival, and in his loneliness he writes as follows of his first November Sunday in the great city:

> If this be the season that John Bull selects for cutting his throat, Sunday must be the day, for then London is in all its ugliness, all its naked deformity.

As time went on this feeling of nostalgia passed away, thanks to the kindness of several of those medical men to whom Bell carried letters of introduction. The leading physician of the day in London was the famous anatomist and pathologist Matthew Baillie, the nephew of the Hunters. Baillie was renowned for his kindness to other members of his profession, and, above all, to young practitioners. With all his kindness of heart, Baillie, when aroused, possessed a sharp tongue, as is shown by the following anecdote. The famous James Gregory, of whom we have already heard, prided himself on his knowledge of all things, great and small. Paying a visit to London, Gregory met Baillie, but the leading London physician made only a poor impression on his Scotch colleague. On his return to Edinburgh, Gregory was asked what he thought of the famous Dr. Baillie. He replied: "Dr. Baillie is a great physician who knows nothing but physic." This remark, being repeated to Baillie, drew forth the retort: "Dr. Gregory knows everything, including even a slight acquaintance with physic."

Sir Astley Cooper, the leading and fashionable surgeon of the day, also befriended Bell and invited

him to witness the work at Guy's Hospital. The famous John Abernethy became one of his greatest friends, and we are told that the old surgeon took him driving in the countryside around London, enlivening the way with tales of his experiences. Bell dined with the Abernethys and visited Vauxhall Gardens in their company, and at the theatre was entranced by the acting of the great Mrs. Siddons in the part of Catherine of Aragon. He breakfasted with Sir Joseph Banks, who, he tells us, "was a kingly figure of an old man with a blazing star on his breast". Sir Joseph Banks fills an honourable niche in the early history of Australia, and his house was the rallying point of the scientists and *literati* of the day.

Bell's reputation as an anatomist and artist had preceded him to London, and with him he brought the manuscript of one of his most famous books, "An Essay on the Anatomy of Expression in Painting". He sought in vain for a publisher, and it was not until 1806 that the first edition appeared. His first year in London, a year of financial worry, he occupied in visiting the art galleries, revising his book and in anatomical studies; but no patients came and the financial situation became acute. The ever-faithful brother George came from Edinburgh, and it was decided to rent a house in Leicester Street, off Leicester Square, equip a lecture room and advertise for pupils. The choice of house was strange. It was an old, dilapidated building; the surveyor who inspected it said he would sooner have nine children laid to his charge than this house over his head.

The first night Bell spent in it, while he was getting into bed, the floor gave way, and in the morning further investigation revealed a mysterious tube or conduit leading down to the basement. A neighbour told him that the house was haunted by an "invisible girl" called "Mary's ghost". The introduction of subjects by Bell for anatomical demonstration added to the mysterious reputation of the house and gave rise to the following ballad, in which Mary relates her misfortunes to her lover:

> The Body-snatchers, they have come,
> And made a snatch at me;
> 'Tis very hard them kind of men
> Won't let a body be.
> The Cock it crows—I must be gone—
> My William we must part;
> But I'll be yours in death, although
> Sir Astley has my heart.

Sir Astley Cooper, of whom I have already spoken, was renowned for his anatomical and surgical demonstrations. He paid handsomely for subjects for dissection, and thus was able to command a regular supply at a time when the other anatomists had considerable difficulty in obtaining sufficient bodies for their pupils. The main source of supply was in the hands of a number of grave-robbers, who were nicknamed resurrectionists; many gruesome stories were told about their activities and finally led to such public terror and outcry that a committee of inquiry of the House of Commons was instituted. Giving evidence before this committee, Sir Astley Cooper made the following statement: "There is not an individual dies in London, let his rank be what it may, whose body I cannot have in my amphitheatre if I choose." By his will Sir Astley bequeathed his own body to the anatomists; perhaps his conscience may have pricked him!

The passing of the *Anatomy Act* in 1832 did away with these abuses and regularized the supply of anatomical subjects.

Bell gave his first lecture on January 20, 1806, to an audience of forty; but only three were paying pupils. However, in February came his first paying patient, and at last a publisher was found for his book, "The Anatomy of Expression". The book was at once received with favour, especially by the painters, who adopted it as a text-book. His friend Jeffrey reviewed it kindly in the dreaded *Edinburgh Review*, the fashionable world read it with approval, and it is said that the Queen spent two hours glancing through it.

This book marks an epoch and was the first work of its kind. In it Bell gives an anatomical description of the muscles concerned with all the many human expressions, such as fear and joy; he points out how artists have erred in depicting on the faces of animals expressions which the arrangement of their facial muscles render impossible, and he points out how in many statues and pictures the artists have made anatomical mistakes. The book is illustrated by some charming drawings and vignettes.

Bell's career was now assured, but paying patients were still scarce, and money even scarcer, and expenses were great.

Meanwhile the professorship of anatomy at the Royal Academy was about to become vacant and Bell was advised to apply for the position. Although he had the support of Abernethy, and Astley Cooper wrote a letter highly recommending his candidature, it was all in vain; the opposition was too strong, and another surgeon of the day, Sir Anthony Carlisle, was elected.

By degrees Bell's practice improved and his lectures gained in popularity, and in 1808 his pupils had grown to thirty-six in number. It is not until 1807 that we get the first hint that Bell was working on the anatomy of the nervous system. Writing to his brother George on November 26, he says:

> I have done a more interesting *nova anatomia cerebri humani* than it is possible to conceive. I lectured it yesterday. I prosecuted it last night till one o'clock, and I am sure it will be well received.

Again in a later letter he says:

> I really think this new Anatomy of the Brain will strike more than the discovery of the Lymphatics being absorbents.

The years 1808, 1809 and 1810 were years of steady progress, and from his letters we gather that

he was still perfecting his work on cerebral anatomy and lecturing and writing papers for the Royal Society.

In 1810 came the battle of Corunna, with the retreat to the sea-coast and the heroic death and burial of Sir John Moore, celebrated by the poem of Thomas Campbell, who was one of Bell's intimate friends. The wounded were taken to Haslar Hospital, and Bell gives a vivid account of the surgical work done in the wards.

Bell was now thirty-six years of age and success seemed assured; and so on June 3, 1811, he married Marion Shaw, whose sister Barbara was the wife of his beloved brother George. His wife brought him a dowry which enabled him to buy a share in the famous Great Windmill School of Medicine, which was owned by a surgeon named James Wilson. This school has been named by Sir Arthur Keith "The London Scottish School of Anatomists", and was founded by James Douglas, who had settled in London in 1700. To him succeeded William Hunter and his more famous brother John.

These men built up noble museums of anatomy, but very small fortunes. To them may be added the names of Cruickshank, Hewson and James Wilson. To the large museum built up by Wilson were now added the specimens, anatomical preparations, wax models and drawings of Bell. The combination produced a very fine collection which filled the heart of Bell with joy, and it is related that he woke his wife up in the middle of the night by calling out: "Oh, May, it will be a noble museum."

With his migration to the Great Windmill Street School began an era of great success for Bell. His lectures were well attended and his surgical practice grew apace.

In 1811 he published a small pamphlet entitled: "Idea of a New Anatomy of the Brain: Submitted for the Observations of his Friends." Unfortunately this pamphlet bears no date of publication, but letters of the time prove that it was published in August, 1811. This little pamphlet was to revolutionize all the prevalent views on the anatomy of the nervous system.

Bell was elected, after a severe contest, surgeon to the Middlesex Hospital in 1814, and was one of the founders of the medical school at that hospital. We have a pleasant account of his methods of teaching in the wards. When he went his rounds his method was to examine a patient with minute care and in silence before the students. Then he would retire a little way from the bed and would give his opinion of the nature of the case and of what the treatment ought to be, adding with particular emphasis his expectation as to the final result. In this year he was admitted a Fellow of the London College of Surgeons.

In 1815 came the Hundred Days and the Battle of Waterloo, and Charles Bell exclaimed to his brother-in-law, John Shaw, who had been with him since a lad, and to whom he was devoted: "Johnnie, how can we let this pass? Here is such an occasion of seeing gunshot wounds. Let us go." And away they went to Brussells; and Charles has left us in his letters some vivid pictures of conditions in that city. He tells us that the arrangements for treating the wounded were hopelessly inadequate, and the two surgeons worked day and night. "It was a strange thing", he writes, "to feel my clothes stiff with blood, and my arms powerless with the exertion of using the knife". His sketches, which he afterwards enlarged to drawings of great merit, are partly in the museum of the Edinburgh College of Surgeons and at the Hospital at Netley.

On his return to London he carried on his work and, as he had now become internationally famous and many French surgeons came to London to see him operate, he learned French so as to be able to converse fluently with them.

The next few years brought some sorrows. The eldest brother, Robert, died in 1816, and the more famous brother John, seeking health in Italy, died at Rome in 1820. Then came the death of James Wilson, his partner in the anatomy school, leaving Bell to bear all the financial strain; so in 1824 the museum was purchased by the College of Surgeons in Edinburgh and in that institution it is preserved to this day. After the death of his brother-in-law, John Shaw, in 1827, Bell severed completely his connexion with the Windmill Street School.

The great relaxation of Charles Bell was fishing, and he writes to George: "I often go a-fishing and without it I know I could not exist." And Lady Bell tells us:

> He was often on the waterside before sunrise, indeed before he could see his flies; and he did enjoy these morning hours. We saw the meadows and the mill, and the sun lighting up the little river like a stream of gold in the evening. We returned home next day, and his health was so well preserved by the exercise that I had cause to bless it.

Many a tired doctor of the twentieth century has found rest and renewal of energy by the trout streams of the Monaro.

In 1832 appeared one of his most popular publications, his Bridgewater treatise on "The Hand: Its Mechanism and Vital Endowments as Evincing Design and Illustrating the Power, Wisdom and Goodness of God". This title sounds strange to modern ears, but at this time learned men were held in thrall by what was known as natural theology, a doctrine put forward with great eloquence by William Paley. Francis Henry, eighth Earl of Bridgewater, by his will in 1835, left the sum of £8,000 to be given to the author of a work "On the Power, Wisdom and Goodness of God as Manifested in the Creation". The executors divided the bequest into eight portions and nominated Bell to one of them. Bell's work is illustrated with some beautiful woodcuts by its author. Meeting with instant success it passed through several editions. While not highly scientific, it makes very interesting reading, and in it we find descriptions of the sixth or muscle sense which was one of Bell's greatest discoveries.

In 1835, Bell, who had received the Guelphic Order of Knighthood on the accession of William IV in 1831, accepted the chair of surgery at the University of Edinburgh; his days in London were ended and he prepared to return to his beloved Scotland. "London is a place to live in, but not to die in", he said. "My comfort has ever been to labour for some great purpose, and my great object has been attained." The remaining years were to produce very little, but of these we will speak later.

Let us first consider his scientific work in London. It may be of interest before describing the discoveries of Sir Charles Bell in the anatomy and physiology of the nervous system to pause for a while and realize what was the state of knowledge at the beginning of the nineteenth century. Bell himself tells us:

> The prevailing doctrine of the anatomical schools is that the whole brain is a common sensorium, that the extremities of the nerves are organised, so that each is fitted to receive a peculiar impression, or that they are distinguished from each other only by delicacy of structure and by a corresponding delicacy of sensation; that the nerve of the eye, for example, differs from the nerve of touch only in degree of its sensibility. It is imagined that impressions thus differing in kind are carried along the nerves to the sensorium and presented to the mind; and that the mind by the same nerves which receive sensation sends out the mandate of the will to the moving parts of the body. It is further imagined that there is a set of nerves called vital nerves which are less strictly connected with the sensorium or which have upon them knots cutting off the course of sensation and thereby excluding the vital motions from the government of the will.

This statement proves that the knowledge of the day was mostly theory handed down from generation to generation of medical men for hundreds of years. Occasionally a more curious spirit carried out experiments, but the experiments usually led to the propounding of wild theories not based on facts. Let us briefly mention a few of these gropers in the dark.

To begin with, let us go back to the ancient Greek times when the philosopher Plato lived, that is, four centuries before Christ. Plato was not a physician, but he had his theories on medical subjects, as has the layman of the present day. Plato decided that the brain was the seat of intelligence and perception and was the governing principle of all. So far, so good, but Plato did not recognize nerves as any different from ligaments and looked upon the brain and spinal cord as made up of a similar substance to the bone marrow. As Plato had a poor opinion of physicians, and looked upon them as encumbrances on the State, who uselessly kept sickly people alive, we will not waste any more time on his views.

Next we come to the great name of Aristotle; but in his anatomy of the nervous system he was still more astray. Aristotle looked upon the brain merely as an organ for cooling the heat and fervour of the heart. Aristotle realized that brain substance and bone marrow were not the same.

Two great anatomists who lived during the years 335 to 280 B.C., at which period the great school of Alexandria was at its zenith, were responsible for some advances. Herophilus was the first to describe and distinguish the cerebrum from the cerebellum. He first distinguished peripheral nerves and divided them into motor and sensory. Erasistratus, in his theory that what he called the animal spirit was formed in the brain from the inhaled air and was the source or cause of mental and nervous action, gave us, as Victor Horsley says, "the first glimmerings of the truth that what we call mental phenomena are the concomitants, if not the result, of the functional activity of the brain and spinal cord, and it is the first attempt to refer those phenomena to their undoubted source". We pass over several centuries and come to a Greek physician who lived in the first century of the Christian era. Aretaeus of Cappadocia was the first to describe the well-known clinical fact that when paralysis is the result of injury to the brain, it occurs on the opposite side to that injured, for the nerves after leaving their origin cross each other in the form of the letter X, whereas when the injury is below the head the paralysis is on the same side as the lesion. This fact, the so-called decussation of the motor tracts, was doubted even in the early part of the nineteenth century.

We now come to Claudius Galen, one of the greatest names in the history of medicine, a Greek physician from Asia Minor who practised and experimented in Imperial Rome at the time of the Emperor Marcus Aurelius, whose personal friend and medical attendant he became. Claudius Galen describes experiments on the spinal cord. Injury to the cord between the first and second vertebræ caused, he observed, instant death. Section between the third and fourth produced arrest of breathing. Below the sixth vertebra it gave rise to paralysis of the chest muscles, breathing being then carried on only by the diaphragm. If the lesion was lower, the paralysis was confined to the lower limbs, bladder and intestines. Galen worked out the physiology of the spinal cord in very considerable detail. He knew that nerves are motor, sensory and mixed, and his experiments of dividing the various cranial and the fifth cervical nerves and his demonstration of the results for the first time threw much light on neurology. Of Galen it may be said that much of the good done by him in advancing medical science was interred with his bones; only the evil lived after him. This was certainly true for fourteen hundred years. For all those fourteen centuries men took his doctrines and built out of them all kinds of systems which kept the medical world in chains until the revival of learning in the sixteenth century. Then came the Belgian anatomist Andreas Vesalius and the foundation of the modern science of anatomy.

Of Galen's experiments everything was forgotten until Bell repeated his experiments and drew the correct inferences therefrom.

I shall pass over the names of Achillini, Jacobus Sylvius, Fallopius and Eustachius, who all contributed their mites to the elucidation of the anatomy of the nervous system, and come to the English physician Thomas Willis, who lived in the Puritan age. To him we owe the first clear description of reflex action, and in his book *"De Anatome Cerebri"* he gave the most complete and accurate account of the nervous system which had yet appeared.

In the eighteenth century flourished that Admirable Crichton of all scientific knowledge, the Swiss physiologist, Albrecht von Haller. Haller was an infant prodigy, writing Latin verse and a Chaldee grammar at the age of ten. Haller was equally eminent as anatomist, physiologist and botanist; he was no mean poet and wrote historical novels. Haller's great contribution to neurology was his proof that irritability or contractility was the exclusive property of muscle tissue and that sensibility was an exclusive property of nervous tissue or of tissues supplied with nerves. It has been said that to read Haller's book on physiology is to realize "how many apparently 'new' discoveries of modern observers had already been accounted for and forgotten".

Let us now proceed to consider briefly the discoveries made by Sir Charles Bell, upon which his fame rests.

First, the differentiation of the function of the roots of the spinal cord into two groups: anterior or motor roots, and posterior or sensory roots. The credit for this discovery has been claimed for the French physiologist Magendie, who in 1822 carried out many experiments on the nerve roots; and one must concede that Magendie carried out more complete experiments. Bell undoubtedly proved by experiment that the anterior roots were motor, but because it would be so painful hesitated to perform the crucial experiment on the sensory roots. Again, Bell did not actually publish a full account of his discovery until 1826; in his pamphlet, "A New Idea of the Anatomy of the Brain", printed in 1811, he says:

> On laying bare the roots of the spinal nerves, I found that I could cut across the posterior fasciculus of nerves which took its origin from the posterior portion of the spinal marrow without convulsing the muscles of the back, but that, on touching the anterior fasciculus with the point of the knife the muscles of the back were immediately convulsed.

The rival claims of the two physiologists have been upheld by their adherents and the old controversy flared up again in 1911, when a long correspondence in *The Lancet* took place between Sir Arthur Keith, who championed the cause of Bell, and Professor Waller, who could see no virtue in Charles Bell.

I think when you read Bell's description of his work you must grant that he had a clear idea of the functions of the two spinal roots, but only definitely proved his theory in the case of the motor root. The work of Bell and Magendie was completely confirmed by the German physiologist Johannes Müller in 1831.

This discovery has been called Bell's law, or, if you prefer it, the Bell-Magendie law.

Secondly, Bell was the first physiologist to postulate the modern physiological doctrine of the "muscle sense" and to place this attribute on an equal footing with the five senses of antiquity. The muscle sense is our awareness of the state of activity of our muscles, the appreciation of the degree of tension or strain or resistance to the action of a muscle or group of muscles, and it is technically called kinæsthesia or the sense related to muscular movement.

On examining the nerves to muscle, Bell found that not all of them really went to muscles; some of them seemed to do the opposite. These, he said, must be the sensory nerves of the muscle. But if the muscle has sensory nerves it must itself be the source of a sense—the muscular sense.

This new doctrine was announced in a paper read to the Royal Society on February 16, 1826, entitled: "On the Nervous Circle which Connects the Voluntary Muscles with the Brain." I do not propose to describe in detail the properties of this muscle sense, but shall merely mention that it is by this sense that we judge the weights of things when we lift them up, that we are made aware of the position of our limbs in relation to our torso, and that we acquire that knowledge of our body in space which we call orientation. In certain nervous diseases, such as locomotor ataxia, the muscle sense is absent in part and the patient walks with far too much effort, exhibiting the high-stepping gait seen in sufferers from this complaint.

To Bell also must be given the credit of first enunciating the doctrine of the specific energy of nerves. The credit for this doctrine has been given to Johannes Müller, but Müller's first work upon specificity did not appear until at least fifteen years after Bell's elaborate consideration of the subject. Bell pointed out that stimulation of a motor nerve produced no sensation of pain in the muscle, but only stimulated the muscle to action. Similarly he says:

> If the retina were sensible to the matter of light only from possessing a finer sensibility than the nerve of touch, it would be a source of torment; whereas it is most beneficially provided that it shall not be sensible to pain, nor be capable of conveying any impression to the mind but those which operate according to its proper function, producing light and colour . . . . The nerve of vision is as insensible to touch as the nerve of touch is to light.

Another original piece of work was the formulation of his "Respiratory System of Nerves", the idea of which again arose from anatomical considerations in relation to nerve distribution. He arranged these nerves into two great divisions, regular and irregular, and while his theory has not stood the test of time, he showed for the first time that the act of respiration was not merely a chemical one, and

proved that the muscles of the face were mainly respiratory in function.

I have not time tonight to discuss his other discoveries, such as his explanation of paralysis of the *portio dura* of the seventh or motor nerve of the face, which is now called facial paralysis or Bell's palsy; his demonstration of the fact that the fifth cranial nerve was both motor and sensory (this nerve is also known as Bell's nerve); and his work on the muscles of the eye, in which he described the phenomenon known as Bell's phenomenon. It is sufficient to say that Bell's wonderful discoveries form a large part of the foundations of physiology and medicine, and he was fortunate that their importance was recognized in his life-time. In a letter dated January 31, 1822, he writes:

> Last week I went to Sir Humphry Davy's and there I found my paper had done me as much good as if I had bought a new blue coat and figured silk waistcoat. Lynn was with me, and showed his good nature by the pleasure that the civil things that were said to me, gave him. In short one gentleman called it the first discovery of the age.

We must now continue the story of Bell's life. We left him about to return to Edinburgh. In a letter to his sister we read:

> The house is in a hustle. Books gone—pictures packing. People surveying the house! This does look like a change. All my sacred corners usurped—a naked house not a home .... I leave no enemy behind me, and Marion is universally beloved .... Without independent fortune, the relations which we have formed with society are not without their drawbacks. I must be independent and through exertion more than fortune .... I could have made a fortune, and so my friends say, but I could not also attain to what I am, and to what they would have me.

On his return to Edinburgh Charles Bell was received by his old friends with open arms and profuse hospitality. He was kindly welcomed at the university, and began his new duties with energy. He lectured to the students and did a considerable amount of surgery, but it must be confessed that his return to Edinburgh was a mistake. Financially he was much worse off than in London, and he tells us that the number of students attending the university had regularly declined and that his income from his class was far less than he had expected.

His health was beginning to fail and he had lost even his zest for fishing. In one letter he writes: "I squint sometimes at my rods, but I do not yet let my fingers touch them. God grant that when I do they may not have lost the power of making a boy of me!"

A third edition of his book "The Anatomy of Expression" being called for, he decided to visit the Continent and view the masterpieces of art in the galleries of France and Italy. In Paris he was received with great honour by the leading medical men, and, being desirous of hearing a lecture by Roux, one of the leading surgeons of the day, he visited his classroom. The French professor, after introducing his distinguished visitor and describing his work, dismissed the class with the remark: "Gentlemen, enough for today; you have seen Charles Bell."

The new edtion of "The Anatomy of Expression" contained vivid descriptions of the masterpieces of art which he had seen on his travels, keenly criticized from a medical point of view. Bell's book on the expressions was a pioneer book on the subject and is a notable contribution to knowledge. Charles Darwin, in the introduction to his own work upon expression, pays the following tribute to Sir Charles Bell: "He may with justice be said not only to have laid the foundation of the subject as a branch of science, but to have built up a noble structure."

Soon after his return to Edinburgh, Bell undertook a journey to London, but only reached Hallow Park in Worcestershire. For some time he had had symptoms of angina and had had several attacks of pain. At dinner that night he seemed in the best of spirits and discussed Leonardo da Vinci's "Last Supper" with his hostess. In a letter we read:

> The evening reading that night was the 23rd Psalm; the last prayer, that beautiful one, "For that peace which the world cannot give", and then he sank into a deep and quiet sleep. In the morning he awoke with a spasm, asked his wife to lift him in her arms, laid his head on her shoulder, and there "rested".

George Joseph Bell died in the following year; and so the brothers were not long separated.

The work of Charles Bell has been compared with that of the immortal William Harvey. These two famous men have many points of resemblance. Harvey worked and experimented and pondered over his new doctrine of the circulation of the blood for twelve years—from 1616 to 1628—and then gave it to the world only when he was certain of the correctness of his views. Bell experimented, worked and pondered over his "new idea" for fourteen years—from 1807 to 1821. Both men found that the enunciation of new discoveries was harmful to their practices. Harvey was unable to explain the circulation of the blood by the current teaching of his time. Bell likewise had to abandon the current theories and formulate a new physiology of the nervous system.

As to Bell's eminence in medical science, let me quote the opinion of Sir Arthur Keith, a great anatomist of the present day: "On whatever standard one proceeds to judge, Charles Bell must be assigned a first place amongst the world's anatomists."

It has been urged against Bell that all his conclusions were not correct, but we must remember that he was dealing with a most complex system in the body, without all those modern aids to investigation which help so greatly the research worker of today. When Bell first came to London, Sir Humphry Davy, the great scientist, said to him: "In your department you can hope for nothing new. After so many men in a succession of ages have laboured on your subject, no further discovery can be expected."

The life and works of Charles Bell prove how mistaken these words were. Vast undiscovered fields still await the patient research worker. Much light has been thrown upon the mysteries of the nervous system, but many a mystery is still unsolved. The sailor or explorer, before starting out on a voyage of discovery, studies the charts and maps and reads the experiences of his predecessors; yet in medicine and other sciences we find many an investigator entering a field of research in blissful ignorance of the work done by previous workers. This has led to much waste of time and disappointment, to claims for discoveries which are only rediscoveries. In a recent inaugural address at Durham, Sir George Newman pleads that for the proper learning of the science and art of medicine there is necessary not only a scientific outlook, a preventive outlook, an outlook comprehending the whole of man's personality and environment, but an historical outlook also.

More than two thousand years ago there lived a man called Socrates, "a man unique in history, of a kind at all times needed". His advice given so many years ago still holds good:

> Employ your time by improving yourself by other men's writings, so that you may come easily by what others have laboured for.

Finally, may I be permitted to congratulate the city of Canberra and its Institute of Anatomy on possessing this lectureship in the history of medicine? For it has been well said that "medicine is a large part of life; and the history of medicine is a large part, possibly the largest, of the history of life".

OUT-PATIENT TREATMENT OF GONORRHŒA IN WOMEN.[1]

By Beatrice Warner, M.B., B.S. (Melbourne),
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The Brisbane Clinics for Venereal Diseases in Women.

In speaking tonight on the out-patient treatment of gonorrhœa in women, I propose first to speak briefly of the two clinics in Brisbane which exist solely for the treatment of venereal diseases in women, the numbers of patients infected with gonorrhœa attending these clinics, the types of disease, the complications—both gonococcal and otherwise—the standard of cure, and the end results; and secondly, of the treatment of these cases as carried out by me.

[1] Read at a meeting of the Queensland Branch of the British Medical Association on July 3, 1936.

The Wednesday clinic, for the treatment of special diseases, that is, for the treatment of venereal diseases in pregnant women, is held once a week at the Lady Bowen Hospital. Five patients with gonorrhœa have been found among the numbers of women with vaginal discharge referred for investigation. These have been referred immediately to the Women's Clinic, so that they may be treated twice or four times a week.

The Women's Clinic for the Treatment of Venereal Diseases was opened in November, 1931, and since then has been open for treatment on two afternoons and two evenings each week. Children under fourteen years of age are not treated there. Since its inception 617 patients have reported for diagnosis, with a total of 9,203 attendances. Of these 617 cases, 344 have been notified as venereal diseases—297 as gonorrhœa. Considering these 297 cases, 166 were classified as acute, 64 as subacute and 67 as chronic gonorrhœa. Six patients have reported after an interval of months or years with, clinically, a second acute attack of gonorrhœa. These were considered fresh infections, and appear twice in this series. The patients were referred from various sources, by the Health Department on discovery of infection in their partners, by private doctors, and in many cases by the patients themselves. Sixty-one patients were referred from the Brisbane Hospital, one from the country and two from other States. The youngest patient treated was aged fourteen years, the oldest sixty-seven.

Complications.

The complications are interesting.

Cystitis with dysuria was not a constant feature; it yielded rapidly to treatment with alkalis, and its incidence is not recorded. Associated with the disease itself were 11 cases of venereal warts, 21 of bartholinitis and 8 of proctitis. No case of skenitis was recorded. Bartholinitis is therefore relatively rare, occurring in approximately 7% of cases. The glands were not considered infected unless enlarged, with pus appearing at the orifice of the ducts on gentle pressure, and a positive smear from the pus.

Eighteen patients were recorded as requiring operative treatment for gonococcal conditions, six before and twelve after admission to the clinic. Forty-eight patients were referred to the in-patient department of the Brisbane General Hospital, either for treatment of acute gonorrhœa or because their disease had progressed beyond the scope of an out-patient clinic.

Here I should like to say that without the cooperation of the Medical Superintendent of the Brisbane Hospital, who has never refused to admit a patient, and the courtesy of Dr. Kenneth Wilson in treating them and informing me of the results, I should frequently have been in difficulties.

In three cases only was a definite diagnosis made of a coincident *Trichomonas vaginalis* infection, although clinically it was present in many more. One case of moniliosis was recorded in a pregnant woman.

One case only of arthritis occurred in this series. That was restricted to the knee joint and responded so dramatically to local treatment of an infected cervix that the patient disappeared.

Three cases were complicated by newgrowth—one by a fibroma of the posterior urethral wall, two by cervical carcinomata.

Fourteen of these cases were notified as syphilis also, six being secondary syphilis.

Thirty-three women were pregnant when they came under treatment; three of these are still being treated. Twenty were delivered at term. None to my knowledge showed complications during the puerperium which could be attributed to the disease. No cases of gonococcal ophthalmia were reported in the offspring. Ten miscarriages occurred. One patient only, and she is still under treatment, showed pelvic complications afterwards. Acute bartholinitis occurred in two of these patients, proctitis followed by an ischiorectal abscess in one.

Three patients were referred for treatment after delivery. In two cases gonococcal ophthalmia had occurred in the babies.

Six of these pregnant women were also syphilitic.

The Standard of Cure.

The standard of apparent cure for the discharge of patients from the Venereal Isolation Hospital consists of the failure to find gonococci in three smears taken at intervals of one week *plus* the absence of all clinical signs. This standard I have followed in discharging patients from the Women's Clinic.

On this standard of cure, 203 of these 297 patients were discharged as apparently cured. Of the remainder, 15 of those referred to the Brisbane Hospital were discharged from there, 33 disappeared, 6 were referred to the Venereal Isolation Hospital, 14 preferred to attend privately for treatment, 3 left the State, and 23 are still under treatment. Thirty-three cases were notified to the Health Department, the patients not attending for treatment. Some were traced.

Treatment.

The treatment I describe is that which, after trial, I have found most productive of results, inexpensive and reasonably quickly given.

There is one cardinal rule in the treatment of gonorrhœa in women. Do not do too much, and in what you do, be gentle. Far more damage is done, in my opinion, by over-treatment than by under-treatment. The patient must be kept clean and the gonococcal pus drained away as quickly as possible by the ingestion of fluids—the use of diuretics and of hygroscopic vaginal tampons. Many patients douche at home, and, provided a douche can, from a height not exceeding eighteen inches above the buttocks, is used—not a Higginson's syringe and not that instrument of damage, the whirling spray—no harm and possibly some good is done. Patients are advised to use at least a quart at each douche and to give it very slowly—comfortably warm, but not hot. For a douching solution in the acute stage the patient is advised to use normal saline solution with one drachm of sodium bicarbonate to each pint, later increasing to hypertonic saline solution with two drachms of sodium bicarbonate to each pint, always swabbing the vulva before and after with a mild antiseptic solution.

During the acute stage of the disease douches only are advised. If the patient cannot douche, tampons soaked in 10% of eucalyptus in olive oil are recommended. Very soon the patients are given magnesium sulphate paste (B.P.), 25% in glycerine, to be used on tampons three times in twenty-four hours. It is remarkable how early this is tolerated; very few patients complain of irritation. If they do so, glycerine only or eucalyptus in olive oil is temporarily substituted for the paste.

It is necessary for the patient to wear a pad, as the discharge, when magnesium sulphate paste is being used, is free and watery. These pads should be destroyable and antiseptic; old linen boiled in a solution of one drachm of boracic acid to the pint of water is useful and does not irritate. This paste has none of the colour disadvantages of ichthyol in glycerine. So much for home treatment.

At the clinic the urethra is not irrigated, nor is the vagina douched. Irrigations of the urethra are most useful if given twice a day in hospital; but twice a week is useless, and few patients can attend more often.

On the patient's first appearance the vulva is swabbed with a freshly made solution of eusol. This solution is used throughout treatment. The urethra is inspected, any pus expressed, and smears taken. Bartholin's glands are then inspected; the gland is gently massaged and smears are taken from any secretion. If pus is expressed—if the glands feel enlarged—and if the duct will admit a blunt lachrymal duct needle, a few drops of eusol are injected, the gland is massaged, and the process repeated. The duct may be dilated if necessary with graduated lachrymal duct probes. The anus is inspected. A moist reddish-brown area surrounding it is most suspicious. With the index finger in the vagina, pressing on the posterior vaginal wall, the patient is told to bear down. If the small amount of mucous membrane which comes into view shows pus, or if a bead of pus is expressed, smears are taken.

A pelvic examination is made and any abnormalities are noted.

A bivalve vaginal speculum (either Graves's or Peterson's) of suitable size is then inserted; discharge is gently swabbed away; the cervix, which is usually eroded to some degree, is inspected, and

smears are taken from it. This, *minus* the taking of smears and pelvic and anal examinations, *plus* in some cases the packing into the vagina and vulva of a strip of gauze soaked in eucalyptus in olive oil, or 25% magnesium sulphate paste, is the treatment of a case of acute or subacute gonorrhœa until the patient's first menstrual period after reporting is well over and the condition has definitely subsided.

Patients are advised to rest and to refrain from douching or using tampons during menstruation. Rest is a counsel of perfection; for many of them are working women or have families.

When the disease has subsided somewhat there is still some pus present in the urethra and cervix. More energetic treatment is then undertaken.

The urethra, after massage is swabbed with a wooden applicator covered with cotton wool soaked first in 5% and later in 10% silver nitrate solution. As a rule, after some weeks, this is sufficient. Should it not be, the urethra is dilated gently with Brown's dilator and again swabbed with silver nitrate solution. Patients complain of a transient dysuria after the application of silver nitrate to the urethra at first; later this treatment is well tolerated.

The cervical canal is then gently swabbed with eusol on a wool-covered modified Playfair's probe to clear away the mucus, dried, then swabbed with two probes soaked in 10% silver nitrate solution. On subsequent visits, if considered necessary, 20% silver nitrate solution may be used. Tampons are still continued. Iodized phenol is sometimes used instead of silver nitrate solution. Small cervical cysts are punctured with a tenotome and swabbed with silver nitrate solution or iodized phenol. I have not found dilatation of the cervix to the internal os to be of any value. An erosion, if present, usually becomes "covered in" under this treatment. I should like to know what part is played by the use of such irritants as silver nitrate or iodized phenol in the production of carcinoma of the cervix in later life.

It is in the treatment of the cervix that the utmost care is so necessary. If this treatment is instituted too soon or carried out too energetically, there is a very real risk of causing an extension of the disease to the uterus and tubes.

I cannot help feeling that among the thirteen cases of pelvic inflammation treated solely by me, until referred to hospital, some were due to my misguided enthusiasm.

An uncomplicated case of gonorrhœa, provided the patient attends regularly, should be apparently cured within three months. The urethra should be, and generally is, clear. If smears from the cervix still contain gonococci, infection must be deeply seated in the glands, and it is time to think of referring the patient for hospital treatment.

Concerning the complications met with, the treatment of bartholinitis has been dealt with. Provided the duct remains patent, or can be dilated, repeated irrigation of the gland is generally successful. If the duct becomes occluded, an abscess may appear, which needs surgical treatment. Venereal warts may be touched with an applicator very thinly covered with wool soaked in glacial acetic acid or pure trichloracetic acid. This, combined with the patient's use of a dusting powder consisting of three parts of powdered salicylic acid, 87 parts of French chalk and 10 parts of lycopodium (recommended by Frank Kidd and A. Malcolm Simpson in "Common Infections of the Female Urethra and Cervix") is generally successful. The treatment may have to be carried out over a period of weeks or months. Patients complain of a stinging pain for a few minutes after treatment; but so long as the warts only are touched, not the surrounding skin, this passes off rapidly. It is inadvisable to treat too many warts at one time. These warts occur whenever the parts are very moist, and are not always gonococcal in origin.

Proctitis is rather hopeless from the point of view of out-patient treatment. Irrigations given twice a week are useless. Irrigations with normal saline or very weak potassium permanganate solution, using a very small quantity and repeated several times, are needed after every defæcation. This is explained to the patient, and if she is accustomed to the use of a Higginson syringe or douche can, it is all very well, and has been successful to the point of clinical cure and the failure to find gonococci in smears in five cases. Three patients were referred to hospital.

The treatment of gonorrhœa in the pregnant woman is simply that of the non-pregnant woman. Patients are advised to attend until delivery, if necessary, and the usual routine of treatment is followed. In no case has treatment interfered with the pregnancy in any way.

Syphilis, when present, is treated at the same time as gonorrhœa. I have not used gonococcal vaccines at the clinic. My experience in a few cases elsewhere was disappointing; but I must admit that vaccines were not exhibited until the case had become extremely chronic and I was in despair.

Various solutions, pessaries and tampons have been used; but my favourite drugs are eusol, magnesium sulphate, glycerine and silver nitrate, as no doubt you have gathered.

This concludes a brief outline of the methods of treatment pursued at the Women's Clinic. It is simple, and therefore easily becomes monotonous and mechanical, and would do so more often but for the patients themselves. Some do not care whether they have the disease or not and are troublesome, often incorrigible. Some take the disease as a matter of course and are merely bored. Some are plunged in the depths of despair, and these need much encouragement.

GONORRHŒA IN THE IN-PATIENT ADULT FEMALE.[1]

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SINCE 1933 it has been part of my duties as honorary out-patient gynæcologist to the Brisbane Hospital to supervise the treatment of the female in-patients of the hospital who are suffering from gonorrhœa and who are fourteen years of age and older. The hospital authorities have set aside a ward in the Metropolitan Hospital for Infectious Diseases for these patients, and only those in whom the gonococcus has been demonstrated microscopically are admitted to the ward. An attempt is made to persuade them to remain in the ward until the examination of three successive smears fails to reveal gonococci. The disease is not treated in the out-patient department of the hospital; but patients are admitted from there when a diagnosis of gonorrhœa is made. A certain number are sent into the ward from the Lock Hospital and from the Venereal Diseases Clinic by Dr. Warner for operative and other procedures which cannot be carried out with the facilities at her disposal.

For the purpose of this paper I have examined the records of the patients coming under my care in 1933, 1934 and part of 1935, and their number is seventy-six. I propose to discuss certain aspects of the disease as revealed by an analysis of these seventy-six patients.

Before proceeding to this discussion it is necessary to remind you that in the female the gonococcus infects several different structures, either simultaneously or in varying combination. The structures are: the urethra, the glands of Bartholin, the *cervix uteri*, the *corpus uteri*, the Fallopian tubes, the ovaries and the rectum. In addition, it may cause morbid conditions at some distance from the primary lesion, for example, arthritis, conjunctivitis, panophthalmitis, septicæmia *et cetera*.

Anatomical Considerations.

For an understanding of the symptoms and treatment of the infection a brief summary of the anatomy of some of the structures involved is essential.

The Urethra.

In the female the urethra is a short tube, about 3·75 centimetres (one and a half inches) in length. On its course from the bladder to its opening in the vestibule of the vagina below the *symphysis pubis*, it passes through the two layers of the urogenital diaphragm, and between these two layers it is surrounded by muscle fibres, which form the internal sphincter of the urethra. Several small glands lie under and open into the floor, and sometimes a number of these are grouped together as a somewhat larger gland and lie near the region of the internal sphincter. The openings of two ducts from Skene's glands, which lie under the floor near the distal opening of the urethra, are usually visible to the naked eye and lie just inside or at times just outside the external orifice of the urethra.

Bartholin's Glands.

The glands of Bartholin are two in number, and lie one in each *labium majus* in the posterior third. It is important to remember that they have a definite capsule, which is formed partly by superficial perineal fascia and partly by bulbocavernosus muscle. It is also worthy of note that the ducts of the glands are of considerable length, relative to the size of the gland, and open at the base of the hymen on each side.

The Cervix Uteri.

In regard to the *cervix uteri*, I shall remind you only that the structure of its compound racemose glands renders it an admirable soil for the cultivation of the gonococcus and makes the problem of its eradication an exceedingly difficult one.

The Corpus Uteri.

In a consideration of the *corpus uteri* it is well to remember that the glands of the endometrium are simple tubular structures and that the endometrium is shed once a month.

The Fallopian Tubes and the Ovaries.

I group the tubes and ovaries together because when the gonococcus infects one it always infects the other. When salpingitis occurs it is practically always bilateral, but not always of equal degree on both sides. The anatomical facts to be remembered are that the lumina of the Fallopian tubes open into the cavity of the uterus medially, that they open into the abdominal cavity laterally, and that the outer pole of the ovary is in close relationship to the abdominal opening of the tube.

Symptoms.

Symptoms of gonorrhœa in the female may be absent, mild or severe, all grades being seen from a small white discharge to symptoms of an acute abdominal disorder. In the series under review the following were the main complaints on admission (where the complaints have been more than one, each complaint has been placed under its appropriate heading):

Vaginal discharge	25
Lower abdominal pain (less than one week)	23
Lower abdominal pain (more than one week)	12
Urinary symptoms (frequency, pain, scalding)	7
Vaginal bleeding	4
Joint pains	3
Upper abdominal pain	1
Pain in the front passage	1
Discharge from the eyes	1
Painful lump on the privates	1
Warts	1
Admitted from Lock Hospital for surgical treatment	11

[1] Read at a meeting of the Queensland Branch of the British Medical Association on July 3, 1936.

It is interesting to see that abdominal pain is the most frequent symptom in this series. This is certainly a much higher incidence than one would expect in out-patient treatment, and is, of course, explained by the fact that salpingitis as a complication often necessitates hospital treatment.

Three patients only complained of joint pains on admission, and none in the series developed arthritis while under treatment in the hospital. It would appear that untreated gonorrhœa is more likely to lead to this complication than gonorrhœa receiving adequate treatment.

One patient was admitted suffering from conjunctivitis of both eyes, which responded to treatment. None of the others developed the condition, and so far I have not seen it as a complication in any of the patients under treatment. In the adult reasonable care in the performance of the toilet is a sufficient prophylactic.

The patients admitted from the Lock Hospital are those received by arrangement with Dr. Warner, and are admitted for a definite surgical procedure and then returned to her.

Signs of the Disease.

The search for signs of gonorrhœa is most important, and it is helpful to have a definite routine in this.

The abdomen is first examined and then the external genitals are inspected, with the patient in the lithotomy position and in a good light.

The urethral orifice is inspected and as a routine the floor of the urethra is compressed against the *symphysis pubis* by the index finger of the right hand, commencing at the internal sphincter and passing outwards. This empties the glands in the floor, and often two little beads of pus can be expressed from Skene's ducts by this manœuvre. I regard this latter sign as most suspicious of the presence of gonorrhœa.

The orifices of the ducts of Bartholin's glands are next inspected and the glands themselves palpated with the index finger and thumb of the right hand for the gland on the right side and the left index finger and thumb for the gland on the left side. This will detect enlargement and tenderness of the gland and may cause pus to exude from the duct. Often redness of the orifice of the duct is the only abnormality detectable; it has been referred to as the gonorrhœal macule, but I do not think this sign is pathognomonic of gonorrhœa, as the redness occurs in other conditions, for example, infection with the *Trichomonas vaginalis*. Pus expressed from the duct is a much more suspicious sign.

A bimanual examination is next performed and gives necessary information as to the structures within the pelvis.

A bivalve speculum is then passed into the vagina and the *cervix uteri* examined. I do not think there is any way of telling a gonococcal endocervicitis from any other variety, other than by detecting the gonococci microscopically in the discharge therefrom.

The anal region is then inspected, as infection of this region is not uncommon. Here again proof rests with the pathologist; but a suspicious sign is an area surrounding the anus about as large as a five-shilling piece, resembling the appearance of wet brown paper.

Treatment.

While in hospital the patients receive daily treatment from the sister in charge of the ward or a staff nurse. This consists in the irrigation of the urethra with a weak solution of potassium permanganate, using a reverse flow metal cannula, and the painting of the urethral canal with a 10% solution of silver nitrate. The vagina is douched twice a day with a solution of one drachm of lysol to the pint of water; the cervix is painted with a 10% solution of silver nitrate by means of a dressed Playfair's probe, twice a week, and a tampon soaked in a solution of ichthyol in glycerine is inserted daily into the vagina and left there until the next douche is given. Hot sitz baths are taken twice a day. On one day of each week the treatment is performed by the resident medical officer, and on one day of each week all the patients are examined and treatment is carried out by me. The additions to the routine treatment on my visit are the dilatation of the urethra by means of Hegar's dilators, when pus is present in the canal, and the injection of antiseptics, occasionally into Skene's ducts and more often into the orifice of Bartholin's duct. The antiseptic used is a solution of flavine (one part in one thousand of water), and the instruments used are a lachrymal duct needle and a "Record" syringe.

When positive smears are obtained from the rectum, a small amount of antiseptic, either saturated boracic acid solution or a weak solution of potassium permanganate, is injected into the rectum after a bowel evacuation, if possible, and retained for some minutes.

Treatment is, of course, suspended during menstruation.

Smears are taken from the urethra, cervix and rectum once a week, and blood for a Wassermann test is taken from each patient on admission.

Standard of Cure.

As a reminder, I think it advisable to quote the standard laid down in "The Provisions of the *Health Acts*, 1900 *to* 1931, Relating to Venereal Disease and the Venereal Diseases Regulations of 1933" and published by the Department of Public Health, Queensland. Section 15*c* reads as follows:

> In the case of gonorrhœa, no certificate of cure (or of apparent freedom from disease) shall be given unless . . . (2) In the case of female patients . . . (*a*) All signs of inflammation shall have been absent for at least three months: (*b*) A microscopic examination of smears taken from the urethra, Bartholin's gland, and cervix, after thorough massage of the uterus shall have failed to detect the presence of gram-negative diplococci resembling

gonococci: the absence of such organisms, however, is not of itself proof of either cure or freedom from infection: (c) A complement deviation test prove negative: (d) A provocative dose of gonococcal vaccine (150 to 250 millions) fail to produce a recrudescence of local symptoms or a reappearance of diplococci. This is not to be administered prior to taking the specimen of blood for the above test: Provided that for the purposes of this section an approved laboratory shall be a laboratory approved of in writing by the Commissioner.

Such a standard may appear difficult of attainment; but in a disease such as this it is very important that no certificate of cure be given unless the disease has been completely eradicated. The standard laid down would certainly seem to assure this, and in those patients, certainly only a few, whom I have seen again after marriage or resumption of marital relations there has so far not been any infection of the husband.

Duration of Treatment.

The series was analysed with a view to estimating the duration of the disease from the day of admission to hospital until the issue of a certificate of apparent cure. There were only twelve of these whose complete records could be traced; the duration of their illness is as set out in Table I. From this table it will be seen that the shortest period was 17 weeks, the longest was 49 weeks, and the average duration was 33 weeks. The patients mentioned in this table were kept in hospital until the examination of three successive smears at intervals of one week failed to reveal gonococci.

TABLE I.

Period of Treatment and Duration of the Illness in Twelve Cases.

Number of Case.	Stay in Hospital (in Weeks).	Duration of Whole Illness (in Weeks).
I	30	38
II	17	40
III	17	30
IV	7	25
V	8	22
VI	14	74
VII	14	39
VIII	17	17
IX	6	20
X	4	20
XI	6	19
XII	20	49

From an analysis of the whole series in the same regard, it appears that 17 were discharged to the Lock Hospital after an average stay of two weeks, while 24 were discharged to Dr. Warner's clinic after an average stay of seven weeks in hospital. The latter were patients who wished to be discharged for one reason or another before three successive smears had been examined without the finding of gonococci.

Thirty-five patients remained in hospital until three successive smears contained no gonococci, the average duration of their stay being eleven weeks.

Two patients were discharged to their own private medical attendant after an average stay of eleven weeks.

One patient was discharged to a public hospital in Melbourne after a stay of eight weeks, and one patient absconded after having been in hospital for twenty-nine weeks.

It can be seen from these figures that it is a difficult matter so to improve the condition of these patients that examination of smears reveals no gonococci in a short time, even when they are in-patients and receive active daily treatment supplemented by operative measures. It is difficult to imagine how the disease can be eradicated more quickly, and I should say that an average stay in hospital of eleven weeks is as much as can be expected.

The Age of the Patients.

There were 20 patients between the ages of fourteen and twenty years, 41 between twenty and thirty years, eight between thirty and forty years, three between forty and fifty years, three between fifty and sixty years, and one in the sixty to seventy year group. The oldest patient was sixty years and the youngest was fourteen.

Complications.

I have excluded urethritis, cervicitis, Bartholinitis and salpingitis as complications. Those occurring were as follows: proctitis once, acute appendicitis once, cystitis once, ischio-rectal abscess twice, pregnancy four times, abscess of Bartholin's glands four times, venereal warts three times, and arthritis three times. Syphilis was diagnosed in seven patients in the series.

Operations.

The following operations were performed: surgical diathermy of Skene's ducts and glands on six occasions, surgical diathermy of the cervix on twenty-six occasions, and amputation of the cervix twice. In addition there were performed: appendicectomy (after the acute attack had subsided), double salpingo-oophorectomy and appendicectomy with drainage, double salpingectomy and ventrofixation, right salpingectomy, incision of pararectal abscess followed by excision of fistula three weeks later, double salpingo-oophorectomy with drainage, excision of a Bartholin's abscess, double salpingo-oophorectomy, dilatation and curettage, appendicectomy, right oophorectomy (cystic ovary), and freeing of adhesions, dilatation of a pinhole os, right salpingectomy and oophorectomy with drainage, left salpingectomy and left oophorectomy with drainage for a left pyo-salpinx and ovarian cyst, appendicectomy, left salpingo-oophorectomy followed by posterior colpotomy, right salpingo-oophorectomy and appendicectomy with drainage, double salpingectomy and right oophorectomy, dilatation and curette, double salpingectomy and right oophorectomy, and, lastly, double salpingectomy.

There were no deaths in the series.

Comments on Treatment.

The Urethra.

Infection of the urethra has been found the most difficult with which to deal. Compression of the urethra with emptying of the glands does not seem to hasten the cure. An attempt is always made to inject an antiseptic into Skene's ducts, but has not proved generally successful on account of the difficulty in inserting the needle. Surgical diathermy has been done in a few patients; but this also is unsatisfactory, as it is difficult to know when the diathermy needle is in the desired position.

The Glands of Bartholin.

The orifice of Bartholin's gland is easy to identify, and usually it is possible to insert a lachrymal duct needle attached to a "Record" syringe and inject an antiseptic. This is done as a routine when pus or mucopus can be expressed from the duct. This may cause the infection to disappear gradually or may even cause an inflammatory reaction with enlargement of the gland. The latter is not undesirable, for then the gland can be excised, and excision of the gland is the only way of making certain that gonococci do not still exist in the gland. If the gland is palpable, I think excision is the correct treatment.

Cervicitis.

In the acute stages I think that rest in bed and at the most vaginal douching are all that is necessary or wise. In the series referred to here there were no patients who could be regarded as having acute cervicitis. After the passage of two or three weeks local treatment should be begun. There are many topical applications recommended; but they all fail in that it is not possible by their means to reach the interior of the racemose glands of the cervix. It is possible with most of them to cause an erosion to heal, to cause the cessation of all discharge and to render smears from the cervix free of gonococci on microscopic examination. But it is more than likely that a source of infection remains in spite of this. It seems, then, that to be sure that no infection persists, it is necessary to remove the cervix or destroy its gland-bearing area. Amputation of the cervix will accomplish the former, and it is a rational procedure; but in many of the patients it is technically difficult. Surgical diathermy of the cervix can accomplish the same purpose, and I have come to regard it as the procedure of choice. In its performance an attempt is made to destroy the whole of the gland-bearing area, which sloughs away, the subsequent raw area gradually healing over. It is very doubtful whether a cervix so treated ever develops fresh glands, and it seems comparatively simple to clear up a subsequent reinfection of the cervix.

Endometritis.

Apart from the occasional occurrence of an acute endometritis in the early stages, the endometrium does not seem to be involved in the disease; that is, chronic endometritis practically never occurs. In this series I have not seen a discharge from the external os that did not cease when the cervix was adequately dealt with. Uterine hæmorrhage does occur occasionally in association with a hypertrophy of the endometrium, but only in association with an ovaritis in which luetin cysts have formed. A return of the endometrium to normal structure and cessation of abnormal bleeding from the uterus are obtained when the inflammatory condition in the pelvis is dealt with.

Salpingitis.

My attitude towards salpingitis is a conservative one, and I regard it as unnecessary and unwise to operate when acute salpingitis is present. In this series there was only one patient operated upon in the presence of acute salpingitis, and her condition was diagnosed as acute appendicitis. I prefer to wait until about eight weeks have elapsed from the onset of the acute attack. The need for operation depends to a large extent on the social position of the patient. If the condition is left alone and treated conservatively by rest, hot vaginal douches *et cetera,* it is known that a percentage of infected Fallopian tubes will be restored to normal function; but the convalescence is slow and is often accompanied for a time by semi-invalidism. The end really justifies the means if the patient can manage to do what is necessary. In the patients who come under my care in the hospital this class is represented by a very small number; and if they leave hospital without operation many of them haunt me in the out-patient department and eventually return to hospital for operation. This is the reason why the operation rate among these patients is fairly high.

With regard to the operation itself, I remove as little as possible, as most of the patients are comparatively young women, but yet attempt to render them symptom-free. The appendix is not removed as a routine, as there is often pus in the pelvis; but it is removed if it is involved in the inflammatory process and also when the operation is undertaken for chronic interstitial salpingitis.

In the early cases drainage was resorted to comparatively often, but very rarely is a drainage tube now used.

Panhysterectomy has not been attempted and seems to me to be too radical a procedure and attended with too great a risk to be justified.

Conclusion.

It would appear, then, that the treatment of gonorrhœa in the female is a painstaking and time-consuming affair; that many of the patients require prolonged treatment in a hospital where all the necessary facilities exist; that the infection can be completely eradicated; and that the standard of cure laid down in the *Health Acts* is adequate.

A SHORT INVESTIGATION OF THE EFFECT OF "ENSOL" UPON A TRANSPLANTABLE MOUSE TUMOUR.

By WARNFORD MOPPETT[1] and N. E. GOLDSWORTHY,[2]
Sydney.

IN 1935, Connell[(1)] described a preparation which he named "Ensol" and with which he claimed to have produced favourable effects by its injection into patients with neoplastic disease. Although the results obtained by other workers[(2)(3)] have not been favourable, local inquiries for this preparation prompted us to carry out this brief investigation with mice bearing the implanted tumour S-37 (Imperial Cancer Research Fund).

Preparation of "Ensol".

Connell's technique in the preparation of "Ensol" was followed in all essentials. Briefly our procedure was to obtain healthy tumour material under aseptic conditions from tumour-bearing mice. This tissue was then cut into small pieces and distributed in tubes in approximately one-gramme quantities. Ten millilitres of sodium chloride solution (0·85%) were added and the saline suspension of tumour tissue was inoculated with bacteria from an agar slope culture of *Clostridium histolyticum*. To obtain a control fluid, ordinary cooked meat, such as is used in Robertson's cooked meat medium, was similarly suspended in saline and inoculated.

All tubes were incubated in a McIntosh and Fildes's jar at 37° C. for seven days. At the end of this time the tumour tissue had been considerably digested, but there was no obvious change in the cooked meat. Sterile filtrates were then made from both sets of cultures (Berkefeld candles, grade N).

Treatment of Tumour-Bearing Animals.

The method of treating the animals and estimating tumour growth followed that adopted in previous work.[(4)(5)(6)]

Briefly, the tumour S-37 was implanted in twenty-five mice and about a week later the diameter of each growth was estimated, palpation being the only reliable method with very early tumours. Selections were then made of three approximately equal groups, one group to be retained as untreated controls (C), another group to receive the control meat culture filtrate (M), the third group the "Ensol" (T) prepared from tumour material of the same strain. In the first three columns of the table the initial diameters in millimetres of the fifteen tumours selected are given. When possible, subgroups of three equal sizes were selected, but this was not always possible, and deaths, indicated by the blank spaces, upset the arrangement. It is essential that the average initial sizes should be equal, as this ensures making comparisons between tumours of equal (average) growth rate. An injection was given on the day of measurement, and two subsequent doses at three-day intervals. The filtrates were given intraperitoneally, as injection into the tail veins is not always possible. Ten days after the initial treatment the diameters were measured; the ratio of the final to the initial diameter is set out in the fourth, fifth and sixth columns. Finally, the animals were killed and the tumours shelled out and weighed (seventh, eighth and ninth columns).

The whole experiment was then repeated with freshly prepared filtrates.

Results.

The results of the two experiments are combined in Table I, as the death of several animals reduced the number of results. It will be seen that ratio estimations are considered unreliable when the initial diameter is less than two millimetres. In the case of both ratio and gravimetric methods it can be said that tumours of injected animals do not differ from those of controls by more than the experimental error.

TABLE I.

Average Initial Diameter in Millimetres.			Ratio of Final to Initial Diameters.			Final Weight in Grammes.		
(C)	(M)	(T)	(C)	(M)	(T)	(C)	(M)	(T)
7·5	7·5	7·5	4·0	4·0	4·0	6·49	7·82	6·20
3·0	3·0	3·0	7·5	9·0	5·0	2·82	4·01	1·71
5·0	—	5·0	3·0	—	4·5	1·25	—	3·40
6·0	—	6·0	3·5	—	4·5	2·91	—	5·57
2·0	3·0	2·0	7·5	8·0	6·5	1·50	4·77	1·02
3·0	3·0	2·0	7·0	6·0	6·5	3·19	1·31	1·03
1·0	—	1·0	Unreliable			1·28	—	1·13
—	2·0	2·0	—	1·5	11·0	—	0·11	3·28
2·0	—	2·0	7·5	—	7·5	1·32	—	1·41
1·0	1·0	—	Unreliable			0·37	1·09	—
3·4	3·25	3·4	5·7	5·7	6·2	2·35	3·19	2·75

Discussion.

This series is much smaller than had been intended, but while the work was in progress there appeared a further unfavourable report on the action of "Ensol" on implanted tumours. Rusch and Preston[(7)] found that the solutions had no "effect in prolonging the life of the animals" bearing mouse sarcoma 180 and Flexner-Jobling rat carcinoma, or "in preventing or decreasing the number of metastases, or in inhibiting the rate of tumour growth".

There is some evidence that under exceptional circumstances any tumour may be caused to retrogress through the administration of protein or similar substances. For example, Connor and collaborators[(8)] found that the injection of cysteine

[1] Working under the control of the Cancer Research Committee of the University of Sydney and with the aid of the Cancer Research and Treatment Fund.
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into the Jensen rat sarcoma caused necrosis and regression; also that animals in which this retrogression had occurred proved to be immune when inoculated again with the same strain of tumour. Likewise, Shear and Andervont[9] obtained from filtrates of cultures of *Bacillus coli* a water-soluble fraction which was highly potent in producing hæmorrhage in mouse tumours. Such hæmorrhage had been followed in a significant proportion of cases by regression of the tumour.

The negative results obtained with implanted tumours do not necessarily imply that results would be negative with spontaneous human tumours. On the other hand, however, the negative results with "Ensol" in the case of implanted tumours have much significance because, as a rule, implanted tumours are much easier to cure than spontaneous tumours. We feel that clinical investigations might be more profitably carried out with substances which give a clear and consistent effect in implanted tumours.

Conclusion.

We confirm the results of other workers quoted, that "Ensol" preparations have no apparent influence upon the implanted tumours of animals.

Appendix.

With regard to the basis upon which Connell appears to rest his argument, there is no unanimity of opinion as to the ability of a bacterium to produce a specific proteolytic enzyme in response to a given environment. This question is discussed by Haines[10] and by Knight.[11]

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Reports of Cases.

THE USE OF DIATHERMY IN PNEUMONIA.

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THE efficacy of any given therapeutic measure is often difficult to assess through lack of an exactly equivalent control. The following instance of the use of diathermy in pneumonia may be of interest in that the patient has had pneumonia three times in thirteen months and has therefore himself provided a good control.

The data given are provided from my own very brief case notes, aided slightly by memory. When I sought the previous temperature charts I was astonished to learn that the staff had not during the past year or so preserved them. A most valuable piece of evidence has thus been lost.

The patient, V.DaR., is an Italian timber worker, aged thirty-two years, resident nine years in Australia. He has lived the whole time in this district, a wet, hilly timber area, and, for this State, very cold most of the year. Past history revealed no illness except four years ago an attack of what was apparently influenza. This kept him in bed for four days and he was pretty "shaky" for some days after that.

First Attack.—On May 17, 1935, I was called to the patient's house. He was in bed in a small, ill-ventilated, ill-lighted room, facing south. He said he had had influenza for one and a half weeks. Cough and pains were now keeping him in bed. His appearance confirmed his story, and examination of his chest revealed no abnormal signs. Symptomatic treatment was given, including advice about ventilation, attitude in bed *et cetera*. The man is intelligent and speaks good English; but his wife speaks no English and apparently has little nursing aptitude. His condition did not improve, and four days later, in the late afternoon, I received another call. He obviously had pneumonia, and examination of the chest revealed the usual signs, well developed, at the right apex. I took him to hospital, and as soon as he was comfortably settled I applied diathermic heat to the apex with my Watson Mark 10 apparatus; electrodes were four by six and a half inches and four and a half by eight inches, between which a current of 2,000 milliampères was passed for thirty-five minutes. There was a profuse skin reaction during the treatment, and this continued afterwards.

The crisis occurred during the night. Next morning his temperature was normal and remained so from then on. He also looked and felt better. Signs persisted; on May 23 there were still tubular breath sounds and crepitations at the extreme right apex. On May 27 the apex was clear, but a dry pleural rub was noticed at the left base dorsally. He was discharged from hospital on June 4, 1935, and called to see me on June 19, 1935. He felt well, but there were sonorous rhonchi in most areas of the chest.

Second Attack.—I was called to the patient on October 1, 1935. He said he had had influenza again. He had been in bed for three days and was moderately ill. His chest was clear. He looked as if he had influenza, which was very prevalent at the time, and again I allowed him to stay at home. I received a morning call two days later. He looked worse. There was rusty sputum, although the respiration rate was not much elevated. Rhonchi were present in most areas, and râles in the right base laterally. He was admitted to hospital.

His illness ran the usual course, and on October 6 I noted that rusty sputum was still present. He had had a good deal of delirium. The lower two-thirds of the right lung were consolidated; very marked bronchitis was present all over the left lung. Next day, October 7, 1935, the breathing was easier. The patient was still somewhat delirious. The condition of the right lung was unchanged. The left had lost the rhonchi, but slightly diminished breath sounds were present over the lower part. In the evening I applied diathermy to the right lower lung—2,500 milliampères for twenty-three minutes. This caused some diaphoresis.

The patient's temperature was down the next day and remained down. I am not sure whether there was a definite crisis—this is where the chart would have helped me—but on October 10 I noted that the temperature, pulse rate and respiration rate had been normal for three days, and that the patient had slept well the previous two nights after taking a mixture of aspirin, phenacetin and caffeine, whereas previously morphine had failed to induce restful sleep.

On October 15 he was allowed up on a lounge, and he went home on October 18.

Third Attack.—I was called to see the patient on June 5, 1936. His clinical appearance was as on the previous occasions. He had been perfectly well since the last illness, until he got a "cold" a few days before. Rhonchi were present in the right lung, in the upper lobe; a slightly diminished vesicular murmur was audible at the left base; there were no crepitations. He objected to going to hospital, so against my judgement I left him at home. Next morning I was called to him again and sent him straight to hospital. At this stage no tubercle bacilli were found in the sputum, which was again rusty. On June 8 he had tubular breathing below the inferior angle of the left scapula, but still no crepitations. His illness continued to run the usual course, and he had slight delirium once or twice. No diathermy was used, and a crisis occurred on June 11. On June 20, though the patient was otherwise symptomless, there was still slight pain at the left base on deep respiration, and in this area there were audible some rhonchi and a dry friction rub dorso-laterally. On June 23 only occasional rhonchi remained.

Summary.

The first attack was one of right apical pneumonia. The crisis occurred on the (presumably) second or third day, immediately after diathermy was used.

The second attack was one of right basal pneumonia. The crisis occurred on the sixth day, immediately after diathermy was used.

The third attack was one of left basal pneumonia. The crisis occurred on the sixth day; no diathermy was used.

It is readily admitted that there is nothing conclusive here as to the value of diathermy in pneumonia. Possibly other readers could produce cases to throw further light on the subject.

AN UNUSUAL INJURY.

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B.M., a half-caste girl, aged three years, was admitted to the Kalgoorlie Hospital on July 23, 1936. She died on the following morning. She had come from a town on the trans-continental railway line, 500 miles away. She had fallen from a height to a wheelbarrow and had injured her right eye. Both upper and lower lids of the right eye were so swollen with bruising and chemosis that the eye could not be seen. The patient was unconscious from her admission to her death.

At *post mortem* examination it was found that the eye had been forced right back, to be brought into contiguity with the temporal lobe of the brain, in the middle cranial fossa. The brain here was badly pulped, and death was evidently due to cerebral laceration. The strangest feature was that the eye itself was apparently unharmed.

Reviews.

AN HISTORICAL DRAMA.

THE great bush, sheep and cattle stations, the call of the kookaburra, and the bounding kangaroo—Australian authors have so relentlessly harped on these themes that they are regarded as the essence of life in this country, an inevitable drop-scene to any drama, a convention almost as binding as the three unities in the classical play. Fortunately there are exceptions. Major-General Antill, with the collaboration of his daughter, Rose de Warren, has chosen the time of Macquarie, a period rich in dramatic incident, as the setting for his historical play "The Emancipist".[1] The play tells the story of William Redfern, surgeon, of the hardships he suffered and of his ultimate success won by ability and perseverance. It opens in 1797 with Redfern, a youth of nineteen, as surgeon's mate in H.M.S. *Standard*. For his outspoken condemnation of the wretched food meted out to the ship's ratings and for his sympathy with them he was sentenced to be shot. This sentence was commuted to penal servitude for life, on account of his youth. At Redfern's own request he was deported to Australia as a convict. Here a lucky incident and a shortage of doctors led him to be sent, still a convict, to do medical work at Norfolk Island. His integrity and skill finally won him a free pardon, granted by Governor King on January 19, 1803. The third act of the play opens with Redfern as the friend of Governor Macquarie, who accepts him as an equal in spite of the disapproval of those who would treat all emancipists as social outcasts. He has already won a high place in the little community, he is its foremost practitioner, Assistant Surgeon in the Civil Medical Establishment, a Justice of the Peace and one of the founders of the Bank of New South Wales.

Much of the incident of the play centres round the hostility shown to Redfern as an ex-convict. The story of his encounter with Howe, the editor of the *Sydney Gazette*, is told with vigorous humour by the policeman Murphy:

> "You whelp! You scurrilous lying hound! Yer coward and yer blackguard!" cries the doctor, with a whack at the other's backside each time. "You dare to attack *me* in your blackguardly paper, do you? Well, I'll tach yer not to do it." And another whack, harder and louder than before.

The servants, the policeman and the nurse, these secondary characters have vitality, humour and colour, and the dialogue is at its best in their piquant discussions of the events of the moment. There is charm, too, in the scenes in which Macquarie conspires to overcome the antagonism of Mr. and Mrs. Wills to their daughter's attachment to Redfern. The Macquaries are pictured as a kindly and generous-minded couple, and it is easy to believe that they did much to bring a spirit of tolerance and humanity into colonial life.

William Redfern had the distinction of being Australia's first medical graduate. In 1808 there was, of course, no university or medical school; and though Redfern had had training in England he had no degree. Therefore at his own request he underwent an examination to test his technical knowledge; and his diploma was the first issued in Australia.

There is little to criticize in this play, except perhaps the modernity of the tone of the dialogue in the opening scene, an anachronism in Scene I of Act II, when William is said to be departing for Australia by the "steamer" *Minorca* (this was in 1801, whereas it was not until 1831 that a steamer came to Australia) and on page 57 the word "beastialize".

The vitality of the characters in "The Emancipist" and the quick-moving incident should assure its success either on stage or screen. The book is welcome both as a commemoration of an upright and courageous man and as a contribution to Australian drama. While it is perhaps not a great play, "The Emancipist" has vigour, sincerity and naturalness, as well as some first-rate dialogue.

[1] "The Emancipist: An Historical Drama in Three Acts", by J. M. Antill, C.B., C.M.G., and R. Antill-de Warren; 1936. Australia: Angus and Robertson Limited. Crown 8vo., pp. 182. Price: 3s. 6d. net.

The Medical Journal of Australia

SATURDAY, NOVEMBER 28, 1936.

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THE INSTITUTE OF MEDICAL SCIENCE AT ADELAIDE.

DURING recent years the aspect of medicine known as clinical science has been given a great deal of prominence. This, as is well known to those who make any attempt to keep in touch with the development of modern medicine, is due chiefly to the work of Sir Thomas Lewis. As Physician-in-Charge of the Department of Clinical Research at University College Hospital, London, he has had all the resources of the modern laboratory at his disposal, and he has probably done more than anyone else in recent years to correlate clinical findings with the results of laboratory investigations. While it is quite unnecessary to emphasize the importance of this correlation, it is necessary to emphasize the extension of clinical science into the realms of research. Even the most careful clinician cannot claim to follow clinical science, unless, using all the information at his disposal, he carries his inquiries beyond the immediate needs of his patient into the uncharted regions of pathogenesis; if need be, he will have to be prepared to use the experimental method. For the proper pursuit of clinical science some sort of laboratory equipment is needed, and, if new recruits are to be won for the cause, there should at the laboratory centre be a keen and active worker in a controlling position who can act as an adviser as well as a source of inspiration.

In his Richard Stawell Oration published recently in these pages, Dr. C. T. Ch. de Crespigny referred to the establishment in Adelaide of an institute for medical research which he had discussed at the jubilee of the Adelaide Medical School; he also discussed clinical science and quoted words of Sir Thomas Lewis about its establishment in universities. The institute is at present coming into being. The Director, Dr. Weston Hurst, formerly of the Lister Institute, London, has arrived in Adelaide and is devising plans for the erection of the new building. Perhaps readers should be reminded that the institute represents a fusion of interests—those of the University of Adelaide and of the Laboratory of Pathology and Bacteriology of South Australia, which is under the control of the Adelaide Hospital. Half of the stipend of the Director is paid from the Sheridan Bequest for Medical Research in the University of Adelaide and half is paid by the Government of South Australia. The new building is to house the Institute of Medical Science, the University Departments of Bacteriology and Pathology, and part of the Department of Physiology. The Director will, we understand, be charged with the correlation of much of the work of these departments, and solid and useful work may be expected, since he comes to Adelaide with a record of which any worker may be proud, and at a time when Adelaide practitioners are on the tiptoe of expectation and ready to do what they can to further the objects of the institute. It must not be forgotten that the establishment of the new institute has been made possible by the generosity of Miss Edith Bonython, Mr. Norman Darling and

Mr. Tom Barr Smith, who each gave £5,000, and by the provision of £15,000 by the Government of South Australia.

Adelaide has a rare opportunity of pursuing clinical science. If the present resources are carefully husbanded and wisely used, progress will be made. Care will be necessary because the endowment is by no means large. The Director and the controlling committee have to determine how much of the £30,000 is to be spent on building and how much on equipment. The whole sum could not provide a building that would be in any way extravagant, but if it was all spent on bricks and mortar, the work of the institute would probably be hampered for lack of equipment and a halt might have to be called. Obviously, efforts should be made to increase the endowment, either by donations from other generous and public-spirited citizens or by further grants from the Government. Failing this, it is to be hoped that the whole of the present endowment will not be spent on the erection of a building, but that enough will be retained to secure equipment adequate for immediate needs. One other aspect remains to be considered. The institute is under dual control. In the terms of his appointment, the Director is required to devote a certain amount of his time to research. He is also head of an organization that has to carry out routine work in clinical pathology for the Adelaide Hospital and other bodies, as well as for private practitioners. Since this is unavoidable, care must be taken that he is not so rushed with routine work that research is pushed on one side. The controlling committee will surely protect him from such a fate. Private practitioners would do well to recall what was written in these pages about clinical pathologists and their work in the issue of November 7, 1936. All concerned will take the wisest course if they leave the Director a free hand to organize his institute and its working, if they come to his aid when he needs it, and if they keep him as free as possible from routine work that can be delegated to others.

Current Comment.

URTICARIA OF NERVOUS ORIGIN.

It is well known that urticaria may be produced in certain individuals by physical causes, such as cold or heat, and the knowledge that in certain of these cases a similar eruption may appear purely as the result of psychic disturbance suggests that there may be a common origin for both. It is known also that attacks of urticaria have occurred in persons suffering from cerebral lesions in the hypothalamic region. Although arm-chair speculations are apt to be risky when we are in search of truth, it would seem likely that there is a nervous mechanism involved in the production of urticaria and that the exciting factor lies in the skin. Interesting work has just been done on this subject by R. T. Grant, R. S. B. Pearson and W. J. Comeau.[1] These workers have carried out observations on six cases of urticaria of the so-called psychogenic type, that is, those in which the eruption was easily provoked by emotional stimuli. Observation proved that, although emotion was competent to give rise to isolated wheals on the skin, much more characteristic and more profuse eruptions could be produced very readily by such simple physical means as exercise and warmth. This fact made it possible for definite experiments to be carried out. Five of the patients were young women, the remaining patient being a boy aged eighteen. There was a remarkable constancy in the nature of the attacks, which consisted of an efflorescence of small flares one or two centimetres in diameter, in the centre of which were still smaller wheals, both subsiding within an hour. Sometimes the wheals would coalesce, causing large irregular swellings. Itching was a common symptom, but not absolutely constant. Other interesting symptoms accompanying severe attacks were giddiness, sickness, shivering and headache; some of these symptoms could be provoked by the injection of "Doryl", a proprietary choline derivative. It was found that when a general urticaria was produced by some simple means, such as by warming the legs, the eruption did not appear on an arm which had been rendered ischæmic by the application of a sphygmomanometer cuff; but when the patient's body was cooled and the eruption was subsiding, release of the compression of the arm was followed by a profuse outbreak over this previously unaffected area. This points to the release of some chemical agent, such as the H-substance. Variants of this observation confirmed this idea, and it was further proved that the H-substance must be released in the skin through the action of peripheral nerves, as might be expected. Blocking of a peripheral nerve with a local anæsthetic prevented the development of urticaria in its distribution even though the whole of the rest of the body was affected.

[1] *Clinical Science Incorporating Heart*, July, 1936.

Grant, Pearson and Comeau next turned their attention to the consideration of the particular efferent nerves involved and, following the experiences of other observers, they produced urticaria in these patients by giving pilocarpine intramuscularly; they also found that the introduction of this drug into the skin by ionization produced a local eruption. Atropine, on the other hand, almost abolished the urticaria appearing in response to warming the legs. The injection of "Doryl" also produced an urticarial eruption in these patients either by subcutaneous injection or by local ionization. All this information strongly points to the peripheral branches of the parasympathetic nervous system supplying the mechanism for the production of such eruption, or, as Dale calls them, the cholinergic nerves. It would seem, then, that acetylcholine is released in the skin as the result of the stimulation of these nerves and that this in turn causes a liberation of the H-substance from the cells of the skin. The writers suggest that it would be worth while trying to prevent the development of such urticaria by blocking the sympathetic ganglia at the root of the neck; but as yet they have not carried out such an observation. Their further experiments need not be detailed, but they have found no evidence that the sweat glands are in any way concerned.

A further point of interest is that what they call unresponsiveness as regards the skin cells has been observed in these cases. This is not to be confused with the refractory state of the vessels described by Lewis and Grant; it is rather a failure of the skin cells to respond to the usual stimuli which occur after a severe and general outbreak of urticaria and which last a couple of days.

This work is of interest inasmuch as it sheds a light on the mechanism by which urticaria is produced, for, as the more usual "allergic" type is not suitable for experimental purposes on account of its more capricious nature, it would be worth while if more attention were devoted to the rarer and more curious varieties here described.

CASE FINDING IN TUBERCULOSIS.

TUBERCULOSIS still ranks as the most fatal disease of early adult life. In its incipient stages it is one of the most readily diagnosed and easily arrested of affections. Though the death rate has fallen surprisingly during the last two decades, the percentage of cases detected close to the time of onset has not increased to a degree which can be considered satisfactory. According to J. Burns Amberson, junior,[1] the position in the United States of America is reflected in the fact that of 66,861 tuberculous patients, a mere 13·1% were found on admission to hospital to be suffering from the disease in an incipient or minimal stage. This circumstance is largely conditioned by the insidious and stealthy manner in which the disease attacks its victims. Many people suffering from tuberculosis are not conscious of the malady until it has produced relatively advanced lesions in the lungs. Only too often the early subjective symptoms are thought by the patient to be due to nothing more than physical fatigue. In modern communities the young adults and adolescents, young females more especially, are liable to the infection. In America the disease exacts a terrible toll among young negroes. In them the death rate is from five to ten times higher than in corresponding age groups of the white population. Racial predisposition, bad housing and endless and inevitable contact with "open" cases of the disease are responsible for this pathetic state of affairs.

Statistical study shows that the initial lesions are commonly discovered in patients of the age group 15 to 25 years, and in the upper half of one lung. Here they may be seen at patches of lobular infiltration. In favourable cases these patches may be absorbed, with subsequent scarring, inside a few months, and this without the patient's knowledge. But only too often the tuberculous deposit undergoes caseation and liquefaction. Tubercle-laden material is then discharged into the bronchi and the infection of healthy lung tissue rapidly follows.

What every clinician interested in tuberculous disease knows is that physical examination gives entirely negative findings in at least 50% of cases of pulmonary tuberculosis. At best, the most careful examiner often discovers nothing more than a few fine crepitations, often scarcely audible and confined to a very limited area. In such instances the X ray film reveals the presence of a patch of cloudy mottling not more than a centimetre or so in diameter. Even when the disease has reached the stage of excavation and of bronchogenic spread, the diagnosis may be missed, either because X ray and sputum examinations have been omitted or because the bronchitic nature of the signs and symptoms has deceived the physician.

If pulmonary tuberculosis is to be studied as a community disease, the ordinary physical examination of large numbers of people is not enough. In thickly populated centres a study of mortality figures quickly reveals in what age groups and callings the disease has worked most havoc. It is then logically possible, as it is highly necessary, to subject the population concerned to a systematic survey and to search for foci of tuberculosis hitherto undetected. Such a measure, instituted amongst factory workers, young labourers, and even in antenatal clinics, would be an investment of the highest economic importance. Obviously, such a survey resolves itself into a matter of the adequate and, if necessary, the repeated examination of all "contacts" by means of X rays. The expense of the usually employed celluloid film may now be avoided by the use of rapid paper film and by fluoroscopic screenings.

[1] *The Journal of the American Medical Association*, July 25, 1936.

American statistics indicate that the harvest of cases so detected depends directly upon the prevalance of tuberculosis in any given cross-section of the community. If, for instance, the death rate in a given group is between 60 and 100 per 100,000, the new cases discovered may be expected to be of the order of 1·5% to 2·0%. Of these, 70% will be in an early or minimal stage. By an annual repetition of these examinations new lesions have been discovered in lungs which were normal at the first investigation. In a group of nurses repeated examinations of the same subjects revealed that the incidence of new lesions reached the figure of 1% annually. There is colour for the belief that semi-annual examinations of this kind would yield a correct diagnosis in practically 100% of cases. This achieved, the institution of prompt and suitable treatment would do much to effect the disappearance of cavernous phthisis.

In New South Wales a specially constituted board has been engaged for some years in what is known as the campaign against tuberculosis. The board has accomplished much, particularly in the coordination of the work done by sanatoria and by the pulmonary clinics of the larger hospitals. It has been hampered in its work, however, by the public attitude towards tuberculosis. The public has an irrational dread of the disease, and in some poor districts those suffering from it live unenviable lives in the social sense. A nurse calls to attend a patient or to round up "contacts", and the purpose of her visit is known to the whole street. The net result is undesired notoriety for the patient and the patient's relatives. Such happenings are at present unavoidable, and years of educative effort will be needed to effect a change in the public attitude towards the problem.

INDUCED ANALGESIA IN ABDOMINAL DIAGNOSIS.

THE almost daily diagnostic problem of the elucidation of obscure chronic pain in the right flank is of perpetual interest to every practising clinician; and the list of morbid conditions which can frequently or rarely give rise to right-sided abdominal discomfort is of formidable length. As C. Jennings Marshall has recently pointed out, the causes can be divided into two large groups, those of the skeleto-musculo-fascial system and those of visceral location.[1] He considers the former to be of greater incidence than the latter, and often susceptible to ready, if not instantaneous, cure. Manipulation of an acute sacro-iliac luxation, the manual dispersion of a fibrositic nodule, and the injection of a painful nerve with alcohol are procedures which frequently merit such a description.

A procedure which deserves a wider recognition for use in the differentiation between pains of parietal and visceral origin is the blocking by "Novocain" injection of the parietal nerve supplying the tender area. The block is performed at a point proximal to the painful region and is, of course, inapplicable to pains of actual spinal or paraspinal origin. The immediate relief provided in intercostal neuralgia, myalgia, painful scars (with incarceration of the nerve) is of both diagnostic and therapeutic value. In the latter case the "Novocain" block should be followed by alcohol injection.

The relationship of parietal pain of this nature to movement or strain, accidental or deliberately invited by the examiner, is a diagnostic criterion with the virtue of tradition. Further confirmatory evidence can often be provided by asking the patient to rise from the recumbent posture with the arms folded across the chest. If the abdominal area under consideration is again palpated while the patient thus raises himself to the sitting posture, tenderness will be found to persist or be exaggerated if of myalgic origin, but will be absent if due to a chronic visceral cause.

Any measure, however time-consuming, which, by tending to diagnostic accuracy, diminishes fruitless appendicectomy, is to be warmly welcomed. Moreover, the harassed practitioner who, having received the patient again into his care after this ill-timed surgical interlude, has to explain the continuance of the pain as due to "adhesions" or "dropped caecum", may find that an induced diagnostic analgesia gives relief from the primary myalgia or a secondary involvement of a nerve in the operation scar.

[1] *The Lancet*, August 1, 1936.

CINCHOPHEN.

EVERY practitioner is aware of the existence of a number of analgesic drugs of which the basis is phenylcinchoninic acid or, more shortly, cinchophen. These bodies are sold under the trade names of "Atophan", "Phenoquin", "Agotan", "Quinophen", to mention only a few of the more widely known. Some years ago, Professor Leschke, a German authority, stated that in his view cinchophen was a powerful poison with a special propensity for producing degenerative changes in, and even acute yellow atrophy of, the liver; in support, Leschke cited thirty-three cases of such poisoning, eleven of them fatal. He issued the warning that cinchophen must be administered only in small doses, with intermissions between them, that the liver must be carefully palpated throughout the course of treatment, and that the patient's urine must be tested regularly for the presence of urobilinogen. The liver once affected, treatment consisted of injections of glucose and insulin.

The substance cinchophen was discovered in the year 1887. Twenty-one years later it came onto the market under the name of "Atophan" and was much used for the relief of pain as well as for the treat-

ment of gout and other types of arthritis. By 1932, according to W. L. Palmer and P. S. Woodall,[1] there were on sale no less than thirty-two preparations containing cinchophen or its derivatives as an active constituent. About five hundred remedies with cinchophen as the base were later advertised as being solvents of uric acid or as cures for "rheumatism". Today the American public annually consumes an amount of these substances which exceeds forty tons.

In 1913, skin reactions were seen to follow the administration of cinchophen; in 1922, grave toxic effects were noted; and one year later it was common knowledge that the drug might produce jaundice. The first fatal case, accompanied by jaundice, was reported in 1925 by Cabot. Three years ago the records of 117 cases of poisoning were recorded, the mortality rate in this list being 51%. To these Palmer and Woodall have added a further 74 cases of jaundice following the administration of cinchophen or its derivatives, thus bringing the total to 191.

Snyder and others are inclined to discount the poisonous action of cinchophen. They claim to have treated a series of 2,500 patients with chronic arthritis over a period of ten years without encountering one instance in which liver damage might be attributed to the use of the drug. They are of opinion that the fatal cases ascribed to the action of cinchophen were coincidences or were due to faulty methods of administration. They consider that no material change in the incidence of acute yellow atrophy of the liver in the general population would follow the cessation of treatment with cinchophen. Nevertheless, experimental evidence seems to refute these views. Biberfeld, in 1913, gave a dog two doses, each of five grammes, at intervals of several days. The animal died of advanced degenerative changes in the liver. Since that time, microscopic investigation has repeatedly shown that coagulation necrosis with total disappearance of the liver cells, as complete as that due to phosphorus or chloroform poisoning, may follow the ingestion of the drug by dogs and rabbits. The present writers, therefore, have thought it imperative to inquire into the possible relation between the dosage of cinchophen and its toxicity. Are there proper and improper methods of administration? May the drug be safely given, either continuously or intermittently?

The usually recommended dose of cinchophen, "Atophan" and numerous other agents of the kind, is 0·5 gramme (eight grains). The physician is commonly advised to give this amount (or even double this dose) four times daily, but to stop it on the appearance of skin irritation, jaundice or gastro-intestinal upset. Some have stated that a total amount of ten to thirteen grammes is necessary before a therapeutic effect is achieved. To produce this effect the drug is "spaced", being given for four days and withheld during the following four. The substance called "Neocinchophen", which has been held by some to be non-toxic because of its limited solubility, is exhibited in a similar manner. Observation shows that there is no constant relationship between the dosage and its results. Small doses may result in death, while larger amounts prove harmless to other patients. What is worse is that discontinuance of the drug once jaundice has become evident has done nothing to stave off death in the majority of the fatal cases. Sir William Willcox further has drawn attention to the time element as it concerns the problem—to the variable period which may elapse between the giving of the drug and the appearance of signs of poisoning. After the administration, weeks and months may pass before a fatal ending.

In the total of 191 cases now reviewed there were 81 deaths, a mortality rate of 46·8%. The incidence of poisoning was heaviest between the ages of forty and seventy years, a fact due not to weight of years, but to the greater occurrence of painful joint affections requiring treatment during those decades.

The degree to which manifestations of liver damage may be delayed is clearly shown by five cases quoted by Palmer and Woodall. In the first a standard dose of cinchophen was given daily for six months; there were no signs or symptoms until three weeks before death. Another patient took cinchophen in the usual quantity for eight weeks. Two weeks after the administration had ceased the subject became jaundiced and died after an illness of five weeks. A third patient took cinchophen in large doses for a period of three years apparently without ill-effect. Then jaundice suddenly supervened, followed by death in twelve days. In another instance "Neocinchophen" was administered for three weeks only. Death occurred after an interval of nine and a half months. Yet another patient died five months after the drug, which had been taken in very moderate doses, had been discontinued. A reasonable assumption is that the liver damage which supervened in these cases was not an allergic phenomenon, but a manifestation of abnormal susceptibility to the drug. Regarding "Neocinchophen", sometimes stated to be non-toxic, it was observed that of seven patients in the series who took it, five died.

A dispassionate consideration of the facts here briefly set forth would seem to show that cinchophen, even in small doses, may be fatal in a susceptible person. It seems to show, too, that the stoppage of medication when only slight signs and symptoms have appeared may do nothing to prevent a fatal issue. At present, then, there appears to be no safe method by which this drug may be administered indiscriminately to the general run of patients; and though it may be as potentially dangerous, in some persons, as phosphorus or chloroform, no law prevents its sale over the counter.

[1] *The Journal of the American Medical Association*, September 5, 1936.

Abstracts from Current Medical Literature.

PHYSIOLOGY.

The Effect of Fat on the pH of the Contents of the Duodenum.

IN a recent edition of a standard text-book it is stated that fat in the diet probably increases the acidity of the intestinal contents. J. Earl Thomas and J. O. Crider (*American Journal of Physiology*, February, 1936) have investigated the truth of this statement. Their observations were made on four dogs, three of which were provided with cannulated gastric and duodenal fistulæ as described in these writers' previous experiments. In the fourth animal the duodenum was made accessible by bringing it out to a lateral abdominal incision and suturing a portion of the serous surface to the skin, so that after healing a small area of duodenal wall remained exposed. Studies were made after test meals of raw lean meat, of fat alone (beef suet or butter), of fat with meat, of oil given in the course of meat digestion, and of various other meals. Samples of the duodenal contents were collected from a point estimated to be six to eight inches from the pylorus, at twenty to thirty minute intervals over a period of five to seven hours. The pH determinations were made at room temperature on a saline dialysate of the duodenal contents by means of a Hastings-Dubosc colorimeter. Every important detail of the method was checked electrometrically. The results showed that fat tends not to increase, but definitely to diminish the acidity of the contents of the duodenum. Its greatest value, however, probably lies in the light it sheds on the significance of the inhibitory action of fat on gastric secretion and motility. This inhibitory action is probably mainly responsible for its effect on duodenal pH. The exact effect of the various meals was as follows. Following a meal of fat the acidity of the duodenal contents is increased little, if at all, over the fasting level. After a meal of solid fat mixed with meat the acidity of the duodenal contents is less than after meat alone. Marked fluctuations in acidity occur which are associated with the intermittent appearance of gross fat in the duodenal contents. The administration of oil in the course of meat digestion causes a prompt increase in the acidity of the duodenal contents.

The Response of the Rabbit to Insulin.

THE problem of the standardization of insulin has always been a difficult one, owing to the great variation both in the responses of different rabbits to a given dose and of a given individual to repeated injections of similar doses of insulin. Louis B. Dotti (*American Journal of Physiology*, February, 1936) has investigated some factors that may be involved in the response of the rabbit to insulin. In his experience there is considerable variation in the response of the individual rabbit to insulin. Some rabbits show a transient hyperglycæmia (duration ten minutes) after injection of insulin; in others the onset of hypoglycæmia is delayed, though there is no indication of hyperglycæmia; and in still others the onset of hypoglycæmia seems to begin immediately after the administration of insulin. The reason seems to lie in the individuals rather than in the insulin, as different samples of insulin agreed in giving all of these reactions. The author's observations have led him to conclude that the presence and extent of an initial hyperglycæmia is related to the sensitivity of the individual to insulin. Whatever the mechanism of the insulin hyperglycæmia may be, it offers a means of determining the sensitivity of an animal to insulin without subjecting it to an insulin convulsion. Thus the sensitivity may be determined if the rabbit is bled for the initial value, then injected with insulin and the blood sugar samples taken every five minutes for fifteen minutes after the injection. After the blood samples have been taken the rabbit may be injected with glucose and given food to prevent convulsions. From the blood sugar curve the rabbit's convulsive response to insulin can be predicted. In a series of 208 experiments it was found that the percentage drop in blood sugar half an hour after the injection of a fixed dose of insulin is related to the time of onset of the convulsion. The female rabbit is more sensitive to insulin than the male, both in its initial response to insulin injection and in its subsequent responses to repeated insulin injections. The female is more constant in its responses to insulin injections than the male.

Diurnal Fluctuations of the Leucocyte Count in Man.

L. H. WELLS (*South African Journal of Medical Sciences*, June, 1936) has studied the fluctuations of the leucocyte count in young adult males in Johannesburg. Fluctuations in the leucocyte count in supposedly normal humans have been observed for many years. Certain physiological factors, such as temperature, exercise and the ingestion of food, have been suggested as contributory causes, but, apart from these, rhythmic variations, for which no satisfactory explanation has been advanced, have been recorded. Wells obtained twenty-two series of consecutive leucocyte counts; in all, 345 counts were made. The intervals between counts were not always constant, but whenever possible counts were taken at fifteen minute intervals for as long a period as was practicable, in some cases over twelve hours. The total leucocyte counts were made with the Thoma-Zeiss hæmocytometer and diluting pipette, a dilution of 1 in 200 being employed. Two hæmocytometer slides were used, a sample from the pipette being counted on each and the mean of two readings was taken. The blood was obtained in every case by a finger prick, a fresh area being prepared on each occasion. In the differential leucocyte counts a total of 300 cells was counted. The observed fluctuations at short intervals were very large. This was in part due to errors inherent in the technique employed; but the probability exists that there is a more marked fluctuation in this series than has previously been established. This may be associated with the high mean level of the leucocyte count in the subjects studied. The fluctuations (whether real or apparent) of the total leucocyte count do not follow those of the neutrophile count so closely as has been reported by other workers. The general occurrence of a diurnal variation of the leucocyte count, with its minimum in the early morning and maximum in the afternoon, has been shown by these experiments and confirmed from isolated counts. The author advocates, as a routine method, the practice of taking counts in the early morning with the subject at rest. For clinical as well as for research purposes, a technique should be adopted which reduces the errors of counting to a minimum.

Endocrine Control of the Mammary Gland.

THE quarter century preceding 1928 saw very little advance in the understanding of lactation phenomena. But since the introduction of a new factor, the anterior pituitary, and the advent of purified ovarian hormone preparations in general use, laboratory investigations have yielded a steady flow of new facts relating to the endocrine physiology of the mammary glands. Warren O. Nelson (*Physiological Reviews*, July, 1936) has reviewed this phase of experimental endocrinology. His article is concerned only with the hormonic factors operating in lactation; the metabolic and general physiological processes concerned are outside its scope. The concomitant development of the *corpora lutea* and the mammary glands early led to the belief that proliferation of the latter during pregnancy depended entirely upon the hormone of the *corpus luteum*. Later studies have complicated this relatively simple explanation and have shown that other factors are involved. The author considers first the work on the effect of "œstrone", a term suggested for ketohydroxyœstrin, also known under the various names of "Theelin", "Oestrin", "Menformon", "Folliculin" *et cetera*. In males and spayed females of all experimental animals œstrone induces growth of the ducts, that is, a proliferation similar to that observed in the œstrous phase of the cycle. But there are distinct species differences in the response of the mammary gland to œstrone. At one extreme are the dog and mouse, which

show only duct stimulation, and at the other the guinea-pig, which exhibits proliferation of all mammary elements. In passing, the author remarks that the relation of œstrogenic substances to mammary cancer is an important matter. The relation of progesterone, the hormone of the *corpus luteum*, to mammary proliferation may be summarized by saying that in combination with œstrone it induces development of the lobule-alveolar system of most animals to the condition seen in mid-pregnancy. Most of the attempts to induce actual lactation prior to 1928 met with failure. The earlier workers considered lactation to be a process which occurred as the glands reached the height of their development and when the influences which had promoted growth were removed. But repeated attempts to induce lactation met with little success until in 1928 Strickson and Grueté were able to induce copious lactation in rabbits by the use of extracts of the anterior pituitary. The stimulation of lactation by anterior hypophyseal extracts has since been reported in a number of other animals. The author, in a series of papers published during 1932 and 1933, developed an hypothesis that during pregnancy the ovarian hormones induce the proliferative changes that occur in the mammary glands; but that during this time, particularly during the latter phases of pregnancy, when the glands are fully prepared for lactation, they inhibit the actual secretion of milk. This restraining influence was visualized as operating through two channels, namely, by suppressing the secretion of, or release of, the lactogenic hormone from the pituitary and by a direct inhibitory effect on the mammary glands. Thus the high ovarian hormone content during pregnancy would be conducive to glandular development, but inhibitory to lactation. With the decline in the level of the ovarian hormones at parturition the inhibitory influences would be removed, the lactogenic hormone would be secreted and lactation would occur. A summary of the evidence bearing on this hypothesis is given, including consideration of the effect of hypophysectomy upon the development of the mammary gland and upon lactation, of the uterus as a factor in the control of lactation, and of the relation of other endocrine glands and of nervous influences to lactation.

BIOLOGICAL CHEMISTRY.

Creatinine Determination.

S. R. BENEDICT AND J. A. BEHRE (*The Journal of Biological Chemistry*, June, 1936) have described a new colour reaction for creatinine with 3.5. dinitrobenzoic acid in the presence of alkali. The reaction has been adapted to the estimation of creatinine in urine. Determinations made on human urine samples from which creatinine had been removed by Lloyd's reagent, indicated that values for urinary creatinine obtained by the picrate method were 2·5% to 5·0% too high. With the new reagent evidence has been obtained in favour of the view that the "creatinine chromogenic material" of blood is not creatinine.

W. D. LANGLEY AND M. EVANS (*ibidem*, August, 1936) have also described procedures for the estimation of creatinine in urine and blood, using the reaction with 3.5. dinitrobenzoic acid.

Function of Muscle Hæmoglobin.

G. A. MILLIKAN (*Journal of Physiology*, July, 1936) presents evidence to indicate that muscle hæmoglobin possesses the function of acting as an oxygen reservoir for the muscle. Experimentally, the soleus muscle of the cat with intact nerve and blood supply was used. When the blood supply was clamped off the muscle hæmoglobin was reduced at a rate corresponding to the resting oxygen consumption. When tetanic stimuli were applied 20% of the total oxygen capacity of the muscle hæmoglobin was utilized within the first second of contraction, and over 50% within four seconds.

Blood Changes in Normal Pregnancy.

F. H. BETHELL (*The Journal of the American Medical Association*, August 22, 1936) has estimated the hæmoglobin content, erythrocyte count and mean erythrocyte volume in the blood of 66 healthy young women in the last trimester of pregnancy, and of 50 healthy non-pregnant women of the same age group. Of the pregnant women, 10% exhibited blood values which were too low to be accounted for by the normal increased plasma volume (and consequent blood dilution) of pregnancy. Two distinct forms of anæmia were observed. One type was the typical iron deficiency anæmia characterized by lowered colour index, reduction of mean erythrocyte volume and an increased percentage of reticulocytes. This form responded well to administration of iron. In the second type the erythrocytes were found to be of relatively large volume, but normal diameter, and the colour index was normal. Patients with this type of anæmia failed to respond to iron therapy, but their condition improved when given a high protein diet.

Calcium and Protein Changes in Serum during Sleep and Rest without Sleep.

IT has been frequently reported that there is a change in the total serum calcium during sleep and anæsthesia. N. R. Cooperman (*American Journal of Physiology*, August, 1936) has undertaken a limited investigation of the problem. Human subjects and dogs were used. Preceding each experiment no food was taken for twelve and twenty-four hours respectively. In the human subjects blood samples were taken before going to sleep and immediately on wakening. These observations were controlled by having the same individuals lie awake without actually sleeping for an equal length of time. In the animal experimentation an exact criterion of sleep was lacking although the conditions were conducive to sleep. In seven subjects, on seven nights, five to seven hours of sleep were found to cause a slight decrease in total serum calcium, which, coupled with a greater decrease in serum proteins, resulted in a slight but consistent increase in the calcium ion concentration of the serum. Similar changes were found in the same subjects after they had remained awake in a recumbent position for an equal length of time. With a shorter period (one and a half to two hours) of both sleep and rest without sleep there was, in eleven experiments, a more pronounced decrease in total serum calcium, a decrease in serum proteins, no greater than with an interval of five to seven hours, and no change in the resultant calcium ion concentration. One and a half to two hours after the beginning of the experimental period there was a 10% increase in plasma volume in both sleep and rest. At this time red blood cell, hæmoglobin and hæmatocrit determinations showed an increase. Thus the changes shown in the shorter periods of sleep and rest can be correlated with an increase in circulating plasma volume.

The Formation and Destruction of Bile Salts.

J. L. BOLLMAN AND F. C. MANN (*American Journal of Physiology*, June, 1936) have recorded results of experiments on the formation and destruction of bile salts. In the normal dog bile salts could not be detected in the blood and were found only in traces in the urine. After injection of glycocholates and taurocholates only small amounts were excreted in the urine and the injected material rapidly disappeared from the blood. Since no increase of bile salt content of the blood, urine or fæces was found after prolonged daily administrations of five grammes of sodium glycocholate *per os*, it was concluded that destruction of bile salts occurred. After complete removal of the liver, bile salts were not found in the blood or urine. The liver was therefore considered to be the site of formation of the bile salts. That the liver played a predominant part in the destruction of bile acids was indicated by the facts that after complete hepatectomy injected bile salts were recovered quantitatively from the urine, and that after complete biliary obstruction only portion of the injected salts was so recovered. Formation of bile salts was found to be inhibited by such hepatotoxins as chloroform, carbon tetrachloride and tetrachlorethane, but not by toluylenediamine.

British Medical Association News.

SCIENTIFIC.

A MEETING of the Queensland Branch of the British Medical Association was held at the B.M.A. Building, Adelaide Street, Brisbane, on July 3, 1936, DR. ALEX. MURPHY in the chair.

Gonorrhœa.

DR. S. JULIUS read a paper entitled "Gonorrhœa in Children". This paper has not been received for publication.

DR. BEATRICE WARNER read a paper entitled "Out-Patient Treatment of Gonorrhœa in Women" (see page 747).

DR. KENNETH WILSON read a paper entitled "Gonorrhœa in In-Patient Adult Females" (see page 750).

DR. H. W. HORN thanked the speakers for their papers; a great deal of thought had been given to them. He wished to criticize the treatment of the cervix, first by what were purely hygienic means, namely, the saline douche, and secondly by medicaments, which were merely hygienic too. To his mind, medical diathermy appealed greatly, and he had used it for eight years, giving two treatments a week for four weeks, commencing after the acute stage had settled down, then giving one treatment a week for six weeks. It was remarkable how rapidly the gonococci disappeared; after eight or ten treatments no gonococci could be found as a rule. Of course there was then a mixed infection and the discharge did not always clean up.

Dr. Horn mentioned the Corbus-Ferry treatment and asked if Dr. Warner or Dr. Wilson had had any experience of this.

DR. F. A. HOPE MICHÔD thanked the speakers for their papers. He wished to ask Dr. Wilson about his experience of the glycerine treatment of the cervix. Dr. Michôd had treated the in-patient gonorrhœal patients before Dr. Wilson, and patients with obstinate cervicitis with salpingitis he had treated with glycerine; often, as the patient could not stay long in hospital, operation was necessary, and those that had received the glycerine treatment he had found much easier to operate on. There were not so many adhesions to the tubes and other organs. In a few cases the proximal ends of the tubes had been removed, and these had been examined by Dr. Duhig. It had been found that the inflammatory condition was much less pronounced in patients who had previously been treated with glycerine. This had been the result in pyosalpingitis. Dr. Michôd had therefore carried out the treatment more vigorously, as it seemed to him a dreadful thing to remove the tubes in these people, most of whom were young. In his series five patients with pyosalpinx had not had to lie up at all; they were injected two or three times a week with glycerine; no operation was necessary and they had no further trouble. It was a method of treatment Dr. Michôd thought worth persevering with. His series had not been large enough to make him sure of the ultimate results.

DR. L. H. FOOTE thanked the speakers for their papers. He had not had much experience of gonorrhœa; the patients he had seen were mostly women wanting to know if they had the disease. It was fairly easy in acute cases to get gonococci from the cervix and urethra; but in chronic cases it was very difficult. A colleague had suggested that a smear should be made immediately after menstruation; if a swab was then left in the vagina for five to ten minutes to act as an irritant, there would be some discharge exuded; if this small discharge were exuded, one was much more likely to find gonococci in it. Dr. Foote asked what was Dr. Warner's and Dr. Wilson's opinion on this. In the one child with vulvo-vaginitis that Dr. Foote had treated the parents had no sign of the disease; the child had a heavy yellow discharge. Silver nitrate (10%) in anhydrous lanoline was injected into the vagina and left in, and the condition had cleared up in two months. Three successive examinations had revealed no gonococci; but, after hearing Dr. Julius on the subject, Dr. Foote thought he would see the child again.

DR. J. BARR-DAVID thanked the speakers for their papers. As he no longer visited patients he did not now see any cases of acute salpingitis; but in a post-graduate lecture given in England by E. R. J. McDonagh, and reported in *The British Medical Journal* on April 4, 1925, it was claimed that two injections of "S U P 36" at an interval of three days, combined with rest in bed, would cause the disappearance of all symptoms in a week.

Dr. Barr-David discussed the presence of female carriers of gonorrhœa. He had had male patients with typical gonorrhœa which was blamed on women who, examined clinically, gave no evidence of the disease; but smears from an apparently normal cervix or urethra contained gonococci. He also quoted the case of a man married twelve years whom he had treated for acute gonorrhœa. The patient's wife had had gonorrhœa thirteen years previously; but the only sign Dr. Barr-David could find was in Skene's ducts, from which gonococci were obtained.

DR. GEOFFREY HAYES thanked the speakers for their papers. He had seen only one child, a male, aged eleven months, with gonorrhœa, the infection having been contracted in the home.

Dr. Warner had commented on proctitis. Most American books stated that this was relatively rare. Certainly the *sphincter ani* was usually tight and there was squamous epithelium for a distance of 2·5 centimetres (one inch) up the canal; but Continental authors stated that proctitis was relatively common. Probably direct implantation of the gonococcus on the rectal mucous membrane beyond the anus was necessary.

The main standard of cure was the failure to find gonococci on three consecutive examinations. Dr. Hayes thought sufficient use was not made in this country of culture tests. Two or three people had recently devised very good culture media. McLeod and others at Leeds had obtained additional positive cultures in 17% to 56% of cases. In another experiment by the same workers gonococci had been found in smears in 16% of cases as against 33% in cultures. In a later series of cases gonococci had been found in 6·3% of smears and 19·9% of cultures. Three examinations of smears might reveal no gonococci and the serum might fail to react to the complement deviation test when culture would have revealed gonococci. Patients became immune to a strain of the organism that did not then produce symptoms. Price, at the Whitechapel clinic, had also developed a culture technique which was apparently relatively simple.

Dr. Warner's remarks about exercising gentleness in examination and treatment should be stressed. Very few people spoke of the defensive mechanism of the body; Dr. Hayes thought this should be given a chance. Gonorrhœa did not tend to allow antibodies to develop; therefore treatment by hygroscopic methods was not correct, as the antigens were thereby swept away. Very little more should be required than treating the patient gently, allowing the discharge to drain and stimulating the general health of the patient.

Dr. Hayes thought electro-desiccation of venereal warts was the best treatment; he injected them with cocaine solution, and even if there were many he usually completed the operation at one sitting.

In the treatment of gonorrhœa in males he found he had most success with gentle irrigation with potassium permanganate solution, which cleaned the discharge away, followed by mild stimulants. He thought this might be good treatment in females. The thick mucus over the cervix and up the canal should be removed with *Liquor Potassæ* or hydrogen peroxide, and mildly stimulating medicaments applied. General hygienic methods helped the patient to develop antibodies.

When the discharge was chronic, diathermy and sloughing out of the glandular area were most successful. The complement fixation test was fairly reliable; but a posi-

tive result could persist for six to eight weeks, and sometimes longer, after the infection had died out.

DR. ALEX. MURPHY said that gonococcal filtrate had not been mentioned. Had it any application in the female? He had heard of dramatic results in gonorrhœa in males from one of his colleagues.

Dr. Warner, in reply, said that the standard of cure was certainly open to criticism. Smears were not taken as a routine until patients appeared clinically free from infection. What made Dr. Warner think that patients were cured were the following facts: (i) Patients failing to report for treatment in the acute stages were searched for, and on reporting, sometimes months later, having had no treatment in the interval, frequently appeared clinically free from the disease, and exhaustive examinations of smears failed to show the gonococcus. (ii) Many women treated at the clinic became pregnant after being discharged, and the confinement and puerperium were free of gonococcal complications, and the infants had no gonococcal infection. (iii) No complaints so far had been received of infection contracted from women discharged from the clinic. Dr. Warner thought Dr. Hayes would agree with that. Gonococcus filtrate had not been used at the clinic. Dr. Warner did not think that diathermy, short of full surgical diathermy, removing a cone-shaped piece of tissue the full length of the cervix, was of much practical benefit.

Dr. Wilson, in replying to Dr. Horn, said that medical diathermy was not mentioned in his paper, as it was not practicable at the hospital on account of the time factor. Patients were in hospital for several weeks, a tremendous amount of work was done, and Dr. Wilson had tried to find the quickest way of rendering them symptom-free. Medical diathermy for salpingitis was a conservative method; he had not used it for cervicitis. One's attitude in hospital and in private practice regarding treatment were different as one saw a different type of person. It was not possible to render the patients symptom-free with medical diathermy and glycerine unless they were in private practice; in a percentage of these one could render them symptom-free. The method of using intrauterine glycerine injections mentioned by Dr. Michôd, Dr. Wilson regarded to a certain extent as he regarded medical diathermy—merely as an adjunct to getting the inflammation of the tubes to settle down. The removal of tubes and ovaries seemed dreadful; but the patients one attended in the Metropolitan Hospital for Infectious Diseases and in the Brisbane Hospital were only too glad to have at least both tubes removed. After conservative treatment these patients haunted one in the out-patients' department; they wanted to return to their occupations, and yet still had aches and pains. The married women generally had large families and agreed to surgical treatment, as conservative treatment entailed prolonged convalescence. The complement-fixation test was done on the patients on discharge and in the out-patients' department. There was a reaction at the time of discharge as a rule, and as the weeks went by each successive reaction was less marked, until finally there was no reaction. The test was therefore probably a reliable guide.

Dr. Hayes had spoken of cultures. These were probably more valuable; but until the Act relating to gonorrhœa was changed they would not be done, as the standard of cure set out in the Act must be followed up.

A MEETING of the Tasmanian Branch of the British Medical Association was held at the Tasmanian Museum on September 8, 1936, DR. E. BRETTINGHAM MOORE, the President, in the chair.

Pyæmia without Pyrexia.

DR. TERENCE C. BUTLER described an unusual case of pyæmia. The patient, a male aged sixty years, had been admitted to the Hobart General Hospital on June 8, 1936, with a fluctuant swelling under the skin of the thorax, situated just below the angle of the right scapula. He also complained of frequency of micturition and loss of weight occurring during the previous three months.

On examination there was seen to be a large fluctuant swelling in the region described; it was not tender or red, and there were no signs of inflammation round it. The patient was very emaciated. The heart was normal, but examination of the lungs revealed a little dulness at both bases, though there were no added sounds. Examination of the urine in the ward revealed no abnormality, but laboratory examination showed numerous pus cells and a few red blood cells. The temperature was 36·59° C. (97·8° F.), the pulse rate 84 and the respiration rate 22 per minute. The prostate was small and soft; but no abnormality could be found in the abdomen.

An X ray examination was carried out on June 10, 1936. The postero-anterior and right lateral oblique views of the chest suggested that an abscess on the right side was lying in the soft tissue and was not connected with a costal lesion. In the postero-anterior view there was an area of clouding projected in the left side of the thorax, just clear of the heart shadow, with a calcified gland at the left hilum and thickened interlobar pleura on the right side. The picture suggested a tuberculous pulmonary infection. For the localization of the lesion an X ray picture of the left lung was necessary.

On June 11, 1936, the swelling was aspirated by the resident medical officer and a large quantity of thick pus of a peculiarly viscous type was drawn off. The following day there was no sign whatever to show that an abscess had ever been present. The pathologist's report showed that staphylococci only were present.

In view of the report on the pus and the absence of signs in the chest, it was felt that the condition was not tuberculous and that it was probably a neoplasm in the left lung. The Casoni test revealed no abnormality, and there was no reaction to the Wassermann test. The patient, however, continued to have a normal temperature, pulse and respiration rate. Soon afterwards he felt much better and was allowed to get up in the ward.

On June 26, 1936, an X ray picture of the chest showed the right lung to be as before, with a thickened lower bronchus. In the lower third of the left lung there was a clouded area, very defined in outline and with no surrounding mottling. This was not typical of a tuberculous lesion and suggested rather a neoplasm or a small hydatid cyst.

On July 4, 1936, a superficial subcutaneous abscess appeared in the left thoracic region, at about the eighth intercostal space in the anterior axillary line. Like the former abscess, it was not tender and no signs of inflammation were present. The patient's condition was now considered to be one of pyæmia, although his temperature and pulse rate were still normal. The X ray picture confirmed this diagnosis.

The abscess was drained, the pus being of the same type as in the former abscess. But after this the patient's condition gradually became worse and his sputum became purulent. It was considered that the area of dulness was due to an abscess in the left lung. The leucocyte count was 45,000 per cubic millimetre, the increase being mostly in polymorphonuclear cells.

On July 12, 1936, redness and swelling of the orbit appeared. The ophthalmic surgeon considered that this condition probably came from the ethmoids. On July 13 the patient was seen by an oto-rhino-laryngologist, who opened up the left ethmoid but found no evidence of acute involvement. At this time there were also very copious purulent sputum, dulness over the bases of both lungs, and numerous moist sounds of every variety. There was tubular breathing in the base of the right lung.

On July 15, 1936, the patient died. Shortly before his death his temperature rose to 39° C. (102·2° F.); this was the first time it had risen above 37° C. (98·6° F.) since his admission to hospital.

At autopsy the base of each lung was found to be solidified; no abscess was present, but the bronchi were filled with pus. Advanced bronchiectasis was present and a fairly large subphrenic abscess. There was evidence of a general peritonitis. The spleen showed a few small

abscesses; the liver was large, but no abscesses were present; the intestines showed no abnormality. The upper third of each kidney was replaced by pus, although the pelvis of each kidney was normal. The bladder was normal and contained clear urine, macroscopically. The brain was normal and no abscess or inflammation could be detected in the left orbit.

Dr. Butler said that this case presented many pitfalls, since the lack of pyrexia or increased pulse rate, together with the fact that the patient felt well, would not lead one to believe that a pyæmia was present. Also the extreme destruction of the kidneys was not consistent with the amount of pus present in the urine.

DR. F. SHORT, in discussing this case, stressed the need in obscure illnesses, such as this, of having detailed X ray reports on as many systems as possible. He felt that in this instance X ray examination of the kidneys might have shown the bilateral abscesses found at the autopsy. Dr. Short realized that in private work the expense involved would be a deterrent, but at a public hospital such examinations were easily carried out.

DR. RALPH WISHAW said that he was impressed first by the extreme degree of euphoria, and secondly by the absence of pyrexia as well as of inflammatory response at the sites of the abscesses. He had seen at least two other patients with kidney abscesses, the presence of which had not been suspected until they were found at *post mortem* examination.

DR. E. BRETTINGHAM MOORE asked Dr. Butler what, in his opinion, was the primary focus of infection.

Dr. Butler said that considerable discussion had taken place as to whether the infection had spread from the bronchiectasis or from the kidneys; he inclined to the former view, whilst Dr. Duncan, who had undertaken the *post mortem* examination, believed the kidney factor to be the more important.

In reply to Dr. Short, Dr. Butler said that he was of the opinion that even a pyelogram of the kidney area might not have shown any abnormality.

Pulmonary Tuberculosis Abroad.

DR. T. H. GODDARD read a paper entitled "Impressions of Pulmonary Tuberculosis Abroad". He said that it might be of interest to members if he gave a brief account of his impressions of work being done abroad in pulmonary tuberculosis, impressions gained during his recent trip to England and America.

At Brompton Hospital, London, he had been interested to see artificial pneumothorax performed in the clinics. In a morning one would see at least fifty patients coming in for refilling. Skiagrams were taken of them all, a sketch being made to indicate the extent of the collapse. In accordance with this picture and the figures of the last refill (including the pressure at the end of the last refill and the amount of gas put in), the refills were done in rapid succession. At Market Drayton Sanatorium, Salop, England, Dr. Goddard noticed that no local anæsthetic was used. At different institutions in England and America it was curious to see the different types of artificial pneumothorax apparatus used. Quite a large percentage of the patients seemed well, cheerful, and were at work, having merely taken time off to come to the clinic for refilling. One patient who attended the Valley Fall Sanatorium at Paterson, New Jersey, was a policeman on point duty. At the Cheshire Joint Sanatorium, Market Drayton, England, the senior house surgeon himself had tuberculosis and was having fortnightly refills at the hands of the superintendent; several of the sisters and a number of the nurses on active duty also had tuberculosis and were being treated by artificial pneumothorax. At this institution the patients were in all stages of the disease. There were 240 in-patients, of whom a very large percentage were undergoing artificial pneumothorax. Dr. Edwards firmly believed in double pneumothorax, and the amount of dyspnœa in patients treated in this way seemed remarkably small. Dr. Edwards's principle was to start artificial pneumothorax on the second side two weeks later than on the first side, to avoid the severe reaction of simultaneous pneumothorax on both sides. Undoubtedly he was getting good results. Dr. Goddard said that the trend on the Continent was towards a more universal application of artificial pneumothorax than was thought wise in England and Australia. He understood that a report was shortly to be issued by the Joint Tuberculosis Council in England, giving the results of artificial pneumothorax treatment over a period of many years.

Dr. Goddard said that Dr. Edwards was a very keen exponent of phrenic evulsion. He had seen him perform this operation on seven patients in one morning, under local anæsthesia, and the operation seemed very simple. A small incision was made, only three-quarters of an inch long; the sides of the wound were held out with small retractors. Then the operator inserted the artery forceps down into the wound, widened them out, and the posterior border of the sterno-mastoid could be seen. The *scalenus anticus* became visible and, running over it, in the sheath, the phrenic nerve. A hook was placed under the nerve and was pulled with dressing forceps, causing the abdomen to give a little jump, and the patient a cry. Next, local anæsthetic was injected into the nerve and into the brachial plexus. The nerve was grasped with artery forceps and cut; then, by pull on the distal end, it was avulsed right away from the diaphragm. Also any accessory nerves were separated and cut. Dr. Goddard said that elsewhere he had seen the nerve crushed instead of avulsed, in order to cause merely a temporary paralysis of that side of the diaphragm; in such cases the diaphragm recovered its function generally within twelve months. But the permanent paralysis by avulsion seemed to be more favoured; it made the upward displacement of the diaphragm more certain. The custom at the Market Drayton Sanatorium was to perform phrenic avulsion when artificial pneumothorax had already been carried out, but when the cavity persisted. And at the conclusion of artificial pneumothorax treatment Edwards always performed phrenic avulsion, so that there would be less space for the reexpanding lung to fall back into; he also performed phrenic avulsion when tubercle bacilli persisted in the sputum in spite of artificial pneumothorax. But phrenic avulsion was seldom used alone.

Dr. Goddard spoke of interesting work that he had seen at Bellevue Hospital, New York, in the treatment of adhesions that were preventing complete artificial pneumothorax and keeping a cavity open. By carefully regulated refilling it was often possible gradually to stretch the adhesions and close the cavity. Dr. Goddard said that, in view of the great care and skill required in adhesion cutting, it was encouraging to know that this course was being advocated; he himself was now persisting with artificial pneumothorax in cases in which adhesions were holding open cavities, provided the cavities were not too thick-walled and rigid.

Dr. Goddard had been greatly impressed by the work done in adhesion cutting at the Victoria Park Hospital, London, by Dr. Chandler. Dr. Chandler had performed this operation 250 times and had not had one severe reaction; he said that success demanded rigid technique, patience and care. Right and left oblique X ray pictures were taken beforehand to localize the adhesions, and then a skeleton was used to determine the point of entry. Dr. Chandler used the electro-cautery alone for the easier and non-vascular adhesions, but thicker and vascular adhesions were always coagulated with diathermy before being cut with the electro-cautery. The value of this procedure could be appreciated when, through the thorascope, the lung previously held out by the adhesions was seen suddenly to collapse after the operation. Dr. Chandler emphasized the danger of working in the subclavian area. He spent as long as three-quarters of an hour over one adhesion; if the patient complained of pain, which was seldom, he injected an anæsthetic. After an adhesion was enucleated at the parietal attachment, it was interesting to view the coagulated, charred, free end of the adhesion.

From the prognostic point of view, Dr. Goddard said that increasing importance was being attached to the blood sedimentation rate. In most places it was customary to make monthly estimations, and the Westergren tube, graduated in millimetres from 0 to 200, was in general

use. It was considered that cases in which the blood sedimentation rate was favourable had a favourable prognosis. Dr. Hilary Roche, at Montana, Switzerland, thought that a rise in the blood sedimentation rate might serve as the first and only certain indication of the beginning of fresh activity in the contralateral lung when artificial pneumothorax was being carried out. The blood sedimentation rate was also thought to be of value as an indication of progress during convalescence from pleural effusion.

Dr. Goddard spoke of the British Sanatorium at Montana, in Switzerland, with its beautiful outlook and climate. Yet there seemed to be a consensus of opinion that there was no evidence that climate, provided it was not positively unhealthy, had any effect upon the progress of tuberculosis. Undoubtedly the essential factor in the care of patients with pulmonary tuberculosis was rest.

Speaking of the *Bacille Calmette-Guérin* vaccine, Dr. Goddard said that in England there was still scepticism concerning Calmette's scheme of infecting all children at birth with his attenuated strain in order to raise resistance and so to wipe out infant mortality. Many were still impressed with the theoretical danger of infecting a child with tuberculosis. But in some quarters there was a change in attitude, partly due to the report of the Cambridge scientist who had found that, apart from the Lubeck disaster, not one fatal result in Europe had been proved to be due to the vaccine; and one and a half million children had been inoculated. It was seriously proposed that the vaccine should be used in England.

Dr. Goddard next spoke of his visit to the tuberculous community at Papworth, a community of self-supporting citizens, living normal family lives and working in accordance with their capacity. In the village were large workshops fitted with electrically driven machinery to simplify work and to make it less laborious; thus an annual market was found for £100,000 worth of goods. Men and women worked under medical supervision, receiving trade unions' wages, under ideal conditions, and with no strain. In the sanatorium section of the institution patients under treatment learned a trade side by side with ex-patients who had passed through this section and were now earning their living, maintaining their families and living in one of the 200 cottages provided. All patients on admission to this community first went to the hospital for observation and treatment and remained there until they were considered able to work a few hours a day without undue fatigue. Then they were given the opportunity to choose a trade in which to be instructed, and after being transferred to the sanatorium proper they lived in a shelter, working two hours a day, which gave them pocket money and an incentive. Next they were transferred to a hostel where working hours were increased and the *régime* was less strict. Finally they could apply for discharge to the village settlement, where they were paid sufficiently for their maintenance and in ratio to their skill. In regard to the family scheme, Dr. Goddard said that there had been no proved detriment to the children of tuberculous parents living this community life. Much the same type of experiment was being carried out at the British Legion Village at Preston Hall, England, which was an institution for returned soldiers with tuberculosis.

A comprehensive scheme for dealing with pulmonary tuberculosis was being carried out by the London County Council. Provision was made for every reported case of pulmonary tuberculosis in the form of dispensaries, sanatoria, chest hospitals, preventoria, schools for the children, and arrangements for the boarding out of children from the homes of infected parents, as well as aftercare associations. Dr. Goddard said that the same type of work was being accomplished by the National Tuberculosis Association of America.

In conclusion, Dr. Goddard said that he had been impressed with the large numbers of former tuberculosis patients who, after the operation of thoracoplasty, were restored to health with surprisingly little deformity of the chest.

DR. E. A. ELLIOTT expressed surprise that there had been no mention of tuberculin injection as advocated by Dr. Camac Wilkinson.

DR. E. BRETTINGHAM MOORE asked why the preventive inoculation of *Bacille Calmette-Guérin* vaccine was as yet so little employed.

Dr. Goddard, in reply, said that the use of tuberculin by injection was comparatively rare. He also said that the *Bacille Calmette-Guérin* vaccine had been used in over one and a half million children with no ill-effects, except at Lubeck, in which instance there had been an error in the solution used. The general feeling was, however, that some immunity was conferred by these injections.

A MEETING of the Victorian Branch of the British Medical Association was held at the Queen Victoria Hospital, Melbourne, on September 16, 1936. The meeting took the form of a series of clinical demonstrations by members of the honorary medical staff of the Queen Victoria Hospital.

Myasthenia Gravis.

DR. MARION B. WANLISS showed a female patient, aged twenty-four years, who had attended the out-patient department since February 5, 1936. Two years earlier, while walking in the country, she had suddenly lost power in her legs and arms and had had the greatest difficulty in getting home. Two months later there was a similar incident. She continued to have difficulty in walking. Muscular weakness gradually increased. Sometimes, when she attempted to swallow fluid, it returned through her nose, and occasionally she had difficulty in masticating. She was fairly well in the morning, but became weak later in the day, and it was necessary for her to rest before she could carry on again. She could start a meal, but before it was completed the muscles of mastication tired and she became unable to chew. A fork might drop out of her hand. If she talked for long, her voice became nasal and eventually gave out altogether. The sphincters acted normally and the urine was normal. She was three months pregnant. She had been confined for the first time six months earlier. At the time of her first confinement she was unable to walk and was carried into hospital; but the delivery and puerperium were normal, labour lasting approximately eight hours. The thyreoid gland had been enlarged from the age of twelve years, and tonsillectomy had been performed in 1930. The blood serum did not react to the Wassermann test. There was bilateral ptosis; the frontalis muscle had to be contracted in an effort to keep the lids elevated. Apart from the muscular weakness and moderate anæmia the examination findings were normal.

Dr. Anderson had carried out tests for diplopia with the Maddox rod; she reported homonymous diplopia, most marked to the left, the width of the band becoming greater with the passage of time; in five minutes it passed from 15·0 centimetres to 60·0 centimetres (six inches to two feet). There was some vertical diplopia, particularly on looking down, which could be overcome voluntarily. The movements of the muscles of the larynx were reported to be normal.

Dr. Wanliss said that she had commenced treatment with glycine in a dose of fifteen grammes twice a day, on February 12, 1936, and its sweetness had greatly increased the morning sickness. While taking glycine the patient felt that her legs had improved; but her eyelids were very weak. When she was talking she would sit with her elbows on the desk, propping her eyelids open with her little fingers. On February 17, 1936, the estimated daily amount of creatinine in the urine was 0·180 gramme; on February 20, 1936, 1·3 grammes; and on March 3, 1936, 0·95 gramme. On March 15, 1936, ephedrine sulphate, in a dose of 0·03 gramme (half a grain) twice a day, was commenced, in addition to the glycine therapy, and in a fortnight the patient said that she felt much better. The treatment was then carried on without interruption for four months. On July 29, 1936, her supply of glycine ran out, and, under the impression that both had to be taken together, she

discontinued the ephedrine. She had a relapse, but responded promptly when the error was detected and rectified. On August 24, 1936, after labour lasting nine hours, she was delivered normally of a child weighing 3·25 kilograms. The puerperium was normal.

Dr. Wanliss said that the British school favoured treatment of *myasthenia gravis* with prostigmine, an analogue of physostigmine, given by injection, the average dose being five cubic centimetres. Rapid improvement was demonstrable in about five minutes; but the effect wore off in five hours. Boothby, of the Mayo Clinic, recommended glycine in a dose of fifteen grammes twice a day; but Harriet Edgworth, who had the disease herself, advised the use of ephedrine in a dose of 0·025 gramme (three-eighths of a grain) twice a day. In her case it had changed a totally bed-ridden invalid into an almost normal person.

Ulcerative Colitis.

Dr. Wanliss also showed a woman, aged twenty-seven years, who had first attended for treatment on May 24, 1934, with the history of vomiting, violent abdominal pains and some diarrhœa, during the previous three weeks. She had passed blood and slime, and had had some tenesmus for ten days. She was a member of a household of five adults and six children in the country; four of the adults had had similar but less severe attacks, but only one of the children was affected, and with abdominal pains only, though the diet was common to all. The patient had not had any previous attacks of diarrhœa; no amœbæ or cysts were discovered in the fæces, and the patient's serum did not agglutinate typhoid or paratyphoid *A* or *B* bacilli or the *Bacillus enteriditis*. She was given a non-residual farinaceous diet, starch enemata and wash-outs and irrigations of the colon carried out in the knee-elbow position, and was discharged improved, but by no means cured. She returned in August, complaining of slight pain over the sigmoid colon, with several loose motions daily, containing some blood and slime. Dr. Ann Macleod performed sigmoidoscopic examination and found extensive shallow ulceration in the rectum. Culture from the base of the ulcer resulted in the growth of Gram-negative non-lactose-fermenting organisms, which, however, did not agglutinate with the patient's blood. As the patient was losing weight and becoming anæmic and her condition was definitely retrogressing, Dr. Macleod, on October 31, 1934, performed caecostomy, through which saline bowel wash-outs were given. The patient was taught to give the treatment herself and was discharged from hospital on December 22, 1934. She remained comparatively well for a long time. At a sigmoidoscopic examination on April 7, 1935, two large healing ulcers were seen, with granulation tissue heaped up over the surface; these ulcers had healed by July, 1935, and on July 29 the caecostomy opening was closed. She resumed her work in March, 1936, and remained moderately well until early in September, when she contracted tonsilitis, which had resulted in a relapse of her bowel condition, with frequent unformed stools, blood and slime, and a good deal of abdominal pain. Dr. Wanliss mentioned that the patient was permanently taking a roughage-free diet and frequently had courses of iron therapy.

Intestinal Obstruction by a Gall-Stone.

DR. ANN MACLEOD showed a female patient, aged fifty-four years, who had been admitted to hospital on April 25, 1936, with acute intestinal obstruction. At operation Dr. Macleod removed a gall-stone 3·1 centimetres (one and a quarter inches) in diameter, which was impacted in the ileum about 180 centimetres (six feet) above the caecum. The bowel was sutured and the abdomen was drained through a stab wound. Subsequent radiographic examination revealed no calculi; but in Graham's test the gall-bladder did not fill with dye. Dr. Macleod proposed to remove the gall-bladder, but the patient refused further operation. The patient was readmitted on August 10, 1936, after an attack of upper abdominal pain unaccompanied by vomiting. On August 19, at laparotomy many adhesions of the duodenum to the gall-bladder fossa were found. When these had been freed the gall-bladder was only represented by a scarred canal, about 1·25 centimetres (half an inch) long, leading from the common bile duct to the pyloric end of the stomach. Dr. Macleod did not attempt any reconstruction, but removed the appendix.

Tumour of the Breast.

Dr. Macleod also showed a female patient, aged fifty-two years, who had been admitted to hospital on March 18, 1935, on account of a mass in the left breast, present for nine months, increasing in size and becoming tender; there was no discharge from the nipple, there was no attachment to the skin or muscle, and there were no palpable axillary glands. There was a small hard mass attached to the glandular tissue of the upper and outer quadrant of the left breast. It was considered that there was some generalized thickening of the right breast; but no masses were felt in it. Dr. Macleod removed the left breast, and two different sections of it were cut from nodular areas. The pathologist reported that the sections appeared to be of adenomatous tissue; some of the cells looked as though they were secreting, and there was coagulative fluid in some ducts, with leucocytes and round cells in the intervening tissue, but no indication of malignancy. The patient reappeared at the out-patient department on August 6, 1936. She had noticed a lump in the right breast for ten months, which had increased in size and had become painful; but there had not been any discharge from the nipple. She had lost 3·15 kilograms (seven pounds) in weight. A very hard mass was felt immediately above the right nipple, with very slight attachment to the skin but none to the underlying muscle; a very small gland was felt on the medial wall of the axilla. On August 17, 1936, Dr. Macleod operated and carried out a radical removal of the right breast. The pathological report indicated that macroscopically the breast showed a good deal of dilatation of the ducts, particularly near the nipple, and fibrous development about the ducts could be traced well into the breast tissue. Some portions of the breast tissue had an appearance suggestive of fibro-adenoma; but microscopic examination showed an extensive development of carcinomatous growth, affecting both duct and alveoli. In the ducts the type of growth had a complex papillary adenomatous character. In other parts the structure was adenocarcinomatous or frankly of scirrhous type. Many of the ducts and acini contained mucoid material, and the larger ducts were widely dilated and contained amorphous eosinophile material. There was no doubt about the malignancy of the condition.

Dr. Macleod also showed a female patient, aged seventy-four years, who had noticed a lump under the arm for one month. The swelling was not tender and had not inconvenienced her in any way. It was a large, hard, freely movable mass in the anterior axillary fold. No glands could be felt in the axilla; but Dr. Macleod considered that the mass might be a carcinoma in the mammary tail, and stated that she proposed to remove it.

Unilateral Double Ureter.

Dr. Macleod's next patient was a woman, aged twenty-four years, who had been admitted to the Royal Melbourne Hospital on June 28, 1930. At operation six weeks later the appendix was removed and caecopexy performed. Dr. Macleod made a cystoscopic examination on April 4, 1936, and discovered double ureteric orifices on the right side; the urine obtained from the right lateral orifice contained some red blood cells and a few epithelial cells. By the intravenous "Uroselectan" method, on February 7, 1936, the dye was seen in both kidneys ten minutes after injection; there was a bifid pelvis on each side; but the ureters were not well shown, and Dr. Macleod could not be sure how far the double ureter extended downwards. No hydronephrosis was present. The urea concentration was satisfactory, and the urine was not grossly infected. Dr. Macleod thought that it would be unwise to interfere at the present stage.

Eclampsia.

DR. ROBERTA DONALDSON showed a patient who had suffered from eclampsia and had been delivered by

Cæsarean section at the eighth month. The patient was a *primigravida*, twenty-one years of age, who had been admitted on August 25, 1936, having had three fits. She was semiconscious. Her systolic blood pressure was 164 and the diastolic pressure 98 millimetres of mercury. The urine contained a trace of albumin, and the blood urea content was estimated at 44·0 milligrammes per 100 cubic centimetres of blood. There was no œdema. There had been no toxæmic symptoms in the ante-natal period; but the blood pressure reading a month before admission had been systolic 150 and diastolic 90 millimetres of mercury. Stroganoff's method of treatment was employed. The patient took eight fits during the next twenty-two hours, and, although there were good uterine contractions, the cervix had dilated only to the size of sixpence. Classical Cæsarean section was performed, and a living child, weighing 2·42 kilograms (five and a half pounds), was delivered. The patient had another fit six hours and a further seven fits fifty-two hours after delivery; these were followed by rapid recovery. Dr. Donaldson said that what had interested her in the case was the occurrence of severe eclampsia with very little albumin in the urine, the absence of œdema, and the late incidence of fits. She also emphasized the importance of regular blood pressure readings in the ante-natal period.

Placenta Prævia.

Dr. Donaldson also discussed the methods of treatment and results in a series of cases of *placenta prævia*.

(To be continued.)

Correspondence.

THE OPTIMUM SIZE OF HOSPITALS.

SIR: In June, 1935, the King Edward's Hospital Fund published a statistical summary of the income, expenditure and costs of 145 London hospitals for the year. The report covers 100 foolscap pages and is a mine of information.

The relevant conclusion from the point of view indicated above is contained in the comparative statement of cost per occupied bed on page 89. The comparison is limited for practical purposes and certain items are referred to as "statistical costs" because these avenues of expenditure are to an extent controllable and lend themselves to comparisons.

Such items as renewals and repairs to building and plant, finance and interest appeal expenses, rates and taxes are set aside.

On the table on page 89 the stress is laid on provisions and administration, surgery and dispensary, domestic, salaries and wages, miscellaneous and administration.

The result is as follows:

	Cost per Occupied Bed.
1. Twelve general hospitals with medical schools	£211·4
2. Six general hospitals without medical schools, but containing over 200 beds	£168·8
3. Eleven general hospitals containing 121 to 200 beds	£165·9
4. Nine general hospitals containing 80 to 120 beds	£161·0
5. Eleven general hospitals containing under 80 beds, but with resident medical officers	£150·6
6. Eleven general and cottage hospitals containing 40 beds or over and with no resident medical officers	£169·1
7. Ten general and cottage hospitals containing under forty beds and with no resident medical officers	£167·3

To my question: "Why does the presence of a medical school raise the cost?"—chiefly in salaries, wages and domestic—I did not get a simple answer. It may be, and probably is, a question of size and consequent loss of time and labour in transport *et cetera*.

Special hospitals are omitted in this note.

The report agrees in precise language with the opinions expressed by senior American surgeons and Canadian medical administrators respecting the optimum size of a hospital, namely, 250 to 300 beds; that is, if economical administration is desired.

In one London hospital of more than 600 beds, if the medical staff are included, five persons are employed for every three patients.

This table, of course, does not include the out-patient scale of costs, where the statistical cost ranges from: (i) £97·9, (ii) £88·8, (iii) £66·8, (iv) £74·4, (v) £84·8. These figures give the cost per 1,000 attendances.

Yours, etc.,

JAMES W. BARRETT.

103-105, Collins Street,
Melbourne,
November 7, 1936.

PULMONARY TUBERCULOSIS.

SIR: Dr. J. Colvin Storey has written an excellent paper which should at least stimulate thought. I should like to briefly summarize my experience after thirty years' practice in the Riverina.

I have seen a very few children whose infection could be bovine, so few that I might almost be tempted to say that bovine tuberculosis is unknown in this district. I have on so many occasions found that my patient had been previously in direct and close contact with a known case of pulmonary tuberculosis that I have come to regard every case as having "caught" it from another case.

The onset is so insidious and the time which elapses from contact to symptoms so long that this contact can be overlooked. It is far more important, in my opinion, to isolate cases with tubercle bacilli in the sputum than it is to isolate diphtheria or scarlet fever.

I have not the experience of pathology sufficient to discuss the theory of childhood infection with subsequent "lighting up". All I know is that the tired girl who has a cold and looks after a sister or mother with advanced pulmonary tuberculosis is extremely likely to come to me four years later with pulmonary tuberculosis herself.

Yours, etc.,

H. O. LETHBRIDGE, M.B.E., M.B., Ch.M., F.R.A.C.S.

Narrandera,
New South Wales,
November 17, 1936.

Research.

RESEARCH SCHOLARSHIPS IN MELBOURNE.

THE Randal and Louisa Alcock Scholarship and the Alwyn Stewart Scholarship are available for Medical Research in the University of Melbourne. They are open to candidates who have obtained honours in the final honour M.B., B.S. examinations, and may be held in conjunction with other awards made by the Medical Research Committee. Grants will also be available from the Fletcher Research Fund for research into cancer or anæsthetics. Applications should be in the hands of the Registrar not later than December 1 next.

Books Received.

NURSING AS A PROFESSION, by Esther Lucile Brown; 1936. New York: Russell Sage Foundation. Large crown 8vo, pp. 120. Price: 75c. net.

A TEXTBOOK OF SURGERY, compiled by J. Homans, M.D.; Fourth Edition; 1936. Springfield: Charles C. Thomas. Double crown 8vo, pp. 1274, with illustrations by W. C. Shepard. Price: $8 net.

THE PRACTITIONER HANDBOOKS: FAVOURITE PRESCRIPTIONS, edited by Sir H. Rolleston, Bt., G.C.V.O., K.C.B., M.D., F.R.C.P., and A. A. Moncrieff, M.D., F.R.C.P.; 1936. London: Eyre and Spottiswoode Limited (for The Practitioner). Demy 8vo, pp. 227. Price: 10s. 6d. net.

THE PRINCIPLES OF BACTERIOLOGY AND IMMUNITY, by W. W. C. Topley, M.A., M.D., M.Sc., F.R.C.P., F.R.S., and G. S. Wilson, M.D., F.R.C.P., D.P.H.; Second Edition; 1936. London: Edward Arnold and Company. Double crown 8vo, pp. 1656, with illustrations. Price: 50s. net.

Diary for the Month.

DEC. 1.—Tasmanian Branch, B.M.A.: Council.
DEC. 1.—New South Wales Branch, B.M.A.: Executive and Finance Committee.
DEC. 2.—Victorian Branch, B.M.A.: Annual Meeting.
DEC. 2.—Western Australian Branch, B.M.A.: Council.
DEC. 3.—South Australian Branch, B.M.A.: Council.
DEC. 7.—New South Wales Branch, B.M.A.: Organization and Science Committee.
DEC. 8.—New South Wales Branch, B.M.A.: Ethics Committee.
DEC. 8.—Tasmanian Branch, B.M.A.: Branch.
DEC. 10.—New South Wales Branch, B.M.A.: Branch.
DEC. 10.—Victorian Branch, B.M.A.: Council.
DEC. 11.—Queensland Branch, B.M.A.: Annual Meeting.
DEC. 15.—New South Wales Branch, B.M.A.: Medical Politics Committee.
DEC. 15.—Tasmanian Branch, B.M.A.: Council.
DEC. 18.—Queensland Branch, B.M.A.: Council.

Medical Appointments.

Dr. G. A. Lawrance has been appointed Deputy Medical Superintendent, Department of Mental Hospitals of New South Wales.

* * *

Dr. D. O. Shiels has been appointed, pursuant to the provisions of *The Workers' Compensation (Lead Poisoning, Mount Isa) Act of* 1933, of Queensland, Member and Chairman of the Medical Board constituted by that Act.

Medical Appointments Vacant, etc.

For announcements of medical appointments vacant, assistants, *locum tenentes* sought, etc., see "Advertiser", pages XX-XXII.

ANTI-POLIOMYELITIS CAMPAIGN COMMITTEE, MELBOURNE, VICTORIA: Medical Officer.
COMMONWEALTH OF AUSTRALIA: Medical Officer.
INNISFAIL HOSPITALS BOARD, INNISFAIL, QUEENSLAND: Assistant Medical Officer.
LAUNCESTON PUBLIC HOSPITAL, LAUNCESTON, TASMANIA: Resident Medical Officer.
LIVERPOOL STATE HOSPITAL AND HOME, LIVERPOOL, NEW SOUTH WALES: Honorary Assistant Anæsthetist.
MUKINBUDIN ROAD, HEALTH AND VERMIN BOARD, MUKINBUDIN, WESTERN AUSTRALIA: Medical Officer.
PRINCE HENRY HOSPITAL, SYDNEY, NEW SOUTH WALES: Temporary Senior Resident Medical Officer.
PUBLIC SERVICE BOARD, SYDNEY, NEW SOUTH WALES: Medical Officer.
THE WOMEN'S HOSPITAL, CROWN STREET, SYDNEY, NEW SOUTH WALES: Resident Medical Officers.
YALLOURN HOSPITAL, YALLOURN, VICTORIA: Junior Resident Medical Officer.

Medical Appointments: Important Notice.

MEDICAL PRACTITIONERS are requested not to apply for any appointment referred to in the following table without having first communicated with the Honorary Secretary of the Branch named in the first column, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

BRANCHES.	APPOINTMENTS.
NEW SOUTH WALES: Honorary Secretary, 135, Macquarie Street, Sydney.	Australian Natives' Association. Ashfield and District United Friendly Societies' Dispensary. Balmain United Friendly Societies' Dispensary. Friendly Society Lodges at Casino. Leichhardt and Petersham United Friendly Societies' Dispensary. Manchester Unity Medical and Dispensing Institute, Oxford Street, Sydney. North Sydney Friendly Societies' Dispensary Limited. People's Prudential Assurance Company Limited. Phœnix Mutual Provident Society.
VICTORIAN: Honorary Secretary, Medical Society Hall, East Melbourne.	All Institutes or Medical Dispensaries. Australian Prudential Association, Proprietary, Limited. Mutual National Provident Club. National Provident Association. Hospital or other appointments outside Victoria.
QUEENSLAND: Honorary Secretary, B.M.A. Building, Adelaide Street, Brisbane.	Brisbane Associate Friendly Societies' Medical Institute. Proserpine District Hospital. Members accepting LODGE appointments and those desiring to accept appointments to any COUNTRY Hospital are advised, in their own interests, to submit a copy of their Agreement to the Council before signing.
SOUTH AUSTRALIAN: Secretary, 207, North Terrace, Adelaide.	All Lodge appointments in South Australia. All Contract Practice Appointments in South Australia.
WESTERN AUSTRALIAN: Honorary Secretary, 205, Saint George's Terrace, Perth.	All Contract Practice Appointments in Western Australia.

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